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NAVY**

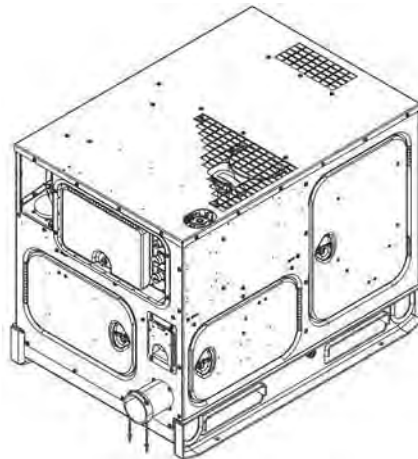
***TM 9-6115-749-24&P
TO 35C2-3-531-2
TM 09292B-OI/1A
TM 7610-LL-L1A-0019**

TECHNICAL MANUAL

**FIELD AND SUSTAINMENT MAINTENANCE MANUAL
INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST**

FOR

**GENERATOR SET, SKID MOUNTED 5 KW ADVANCED
MEDIUM MOBILE POWER SOURCES (AMMPS)
04-1030, 50/60 Hz (NSN 6115-01-561-7329) (EIC MA2)
04-1031, 400 Hz (NSN 6115-01-561-7438)**



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THE ARMY, AIR FORCE, NAVY, AND
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1 JULY 2016

PCN 184 092921 00

WARNING SUMMARY

FIRST AID

For First Aid information, refer to FM 4-25.11.



5

5 SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK

1

DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL

2

IF POSSIBLE, TURN OFF THE ELECTRICAL POWER

3

IF YOU CANNOT TURN OFF THE ELECTRICAL POWER, PULL, PUSH OR LIFT THE PERSON TO SAFETY USING A DRY WOODEN POLE OR A DRY ROPE OR SOME OTHER INSULATING MATERIAL

4

SEND FOR HELP AS SOON AS POSSIBLE

5

AFTER THE INJURED PERSON IS FREE OF CONTACT WITH THE SOURCE OF ELECTRICAL SHOCK, MOVE THE PERSON A SHORT DISTANCE AWAY AND IMMEDIATELY START ARTIFICIAL RESUSCITATION

The Warning Summary summarizes critical safety and hazardous material warnings that must be understood and applied during operation and maintenance of the Advanced Medium Mobile Power Sources (AMMPS) generator sets.

- These warnings are important.
- Study and understand all warnings.
- These warnings can save your life and the lives of personnel with whom you work.

WARNING SUMMARY – CONTINUED

- Some general warnings found in the Warning Summary will not be repeated within the Interactive Electronic Technical Manual (IETM).
- Specific warnings will be listed above the task or paragraph to which they apply.

Operation and maintenance of the AMMPS generator set contains many possibilities for injury or death to personnel. Be sure to be familiar with general first aid procedures as referenced in FM 4-25.11, First Aid.

WARNING ICONS

The following icon graphics are meant to give graphic descriptions of danger. They are not meant to be a substitute for reading the warnings.



EAR PROTECTION - Headphones over ears shows that noise level will harm ears.



ELECTRICAL - Electrical wire to arm with electricity symbol running through human body shows that life-threatening shock hazard is present.



ELECTRICAL - Electrical wire to hand with electricity symbol running through hand shows that shock hazard is present.



FLYING PARTICLES - Objects striking person shows that the material presents a danger to life or health.



HEAVY OBJECT - Human figure stooping over heavy object shows physical injury potential from improper lifting technique.

WARNING SUMMARY – CONTINUED



HEAVY PARTS - Heavy object on human figure shows that heavy parts present a danger to life or limb.



HIGH PRESSURE - Human hand being penetrated by high pressure shows system pressures present a danger to life or limb.



HOT AREA - Hand over object radiating heat shows that equipment is hot and can burn.



MOVING PARTS - Human figure with an arm caught between the gears shows that the larger moving parts of the equipment present a danger to life or limb.



MOVING PARTS - Hand with fingers caught between gears shows that the smaller moving parts of the equipment present a danger to life or limb.

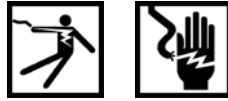


SHARP OBJECT - Human hand being punctured shows equipment presents a danger to life or limb.

WARNING DESCRIPTIONS

WARNING SUMMARY – CONTINUED

WARNING



Electrical

- High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.
- High voltage is produced when this generator set is in operation. Do not contact output cables when operating this generator set. Failure to comply may cause injury or death to personnel.
- High-voltage power is available when the main contactor is closed. Avoid accidental contact with live components. Ensure load cables are properly connected and the load cable door is shut before closing main contactor. Ensure that personnel working with/on loads connected to the generator set are aware that main contactor is about to be closed before closing main contactor. Failure to comply may cause injury or death to personnel.
- High voltages may be present at the generator terminals when unit is rotating. Tools, equipment, clothing, and your body must be kept clear of rotating parts and electrical connections. Special precautions must be taken during troubleshooting because protective covers and safety devices may be removed or disabled to gain access and perform tests. Use extreme caution. Failure to comply may cause injury or death to personnel by electrocution.
- High voltage is produced when generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Do not ground yourself in standing water. Never attempt to connect or disconnect load cables while the generator sets are running. Failure to comply may cause injury or death to personnel.
- Dangerously high voltage can exist across Current Transformer (CT) output with engine operating. CT can explode if disconnected from load with engine running. Do not disconnect CT with Alternating Current (AC) generator rotating. Failure to comply may cause injury or death to personnel by electrocution.
- Shut down generator sets before performing inspection of load cables. Failure to comply may cause injury or death to personnel by electrocution.
- Power is available to the convenience receptacle only when the main contactor is closed. Avoid accidental contact. Electrocution is possible. Failure to comply may cause injury or death to personnel.
- Ensure equipment/vehicles being used to jump-start the generator set are not touching. Touching of metal surfaces can cause improper grounding. Do not allow the cable ends to touch each other or any part of the generator set/vehicle/equipment other than the North Atlantic Treaty Organization (NATO) slave receptacle. Failure to comply may cause injury or death to personnel.

WARNING SUMMARY – CONTINUED

- NATO slave receptacle is electrically live at all times and is not protected by a fuse. Disconnecting main Direct Current (DC) circuit breaker does not ensure the circuit is dead. This circuit is only dead when the batteries are fully disconnected. Disconnect both batteries before performing maintenance on the slave receptacle. Failure to comply may cause injury or death to personnel.
- DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Do not ground yourself in standing water. Failure to comply may cause injury or death to personnel and damage to equipment.
- The right-hand battery negative lead that connects directly to the grounding stud must be disconnected prior to disconnecting or removing batteries. Follow procedural steps in exact order given for removal and installation. Failure to comply may cause injury or death to personnel.
- Ensure the frequency of any device powered by the Ground Fault Circuit Interrupter (GFCI) convenience receptacle matches the frequency of the generator set. Failure to comply can cause serious injury or death to personnel.

WARNING



Heat

- When operating, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow engine to cool before checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.
- When operating, exhaust system has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow engine to cool before performing maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.
- When operating, winterization heater has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow heater to cool before performing maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.
- Wear heat resistant gloves and avoid contacting hot metal surfaces with hands and exposed skin after components have been heated. Wear additional protective clothing as required. Failure to comply may cause injury or death to personnel.
- Top and some housing panels can get very hot. Allow panels to cool down before performing maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.
- Allow engine to cool from normal operating temperature prior to draining engine oil and removing oil filter. Failure to comply may cause injury or death to personnel.

WARNING SUMMARY – CONTINUED

- A turbocharger may become very hot and requires more time to cool down than other parts of engine assembly. Shut down generator set and allow it to cool sufficiently before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.

WARNING



Jewelry/Clothing

- Metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry and do not wear loose clothing when working on equipment. Failure to comply may cause injury or death to personnel.
- While inspecting the operation of the generator set, do not inadvertently reach into the generator set. Failure to comply can cause injury or death to personnel.

WARNING



Lifting

- Comply with all lifting requirements. Observe the decals on equipment and parts that identify the weight and determine if assistance is needed. Maximum lift is 37 lb (16.8 kg) for one person, 74 lb (33.6 kg) for two persons, and 101 lb (45.8 kg) for three persons. Failure to comply may cause injury or death to personnel.
- When lifting the engine, use lifting equipment with minimum lifting capacity of 500 pounds (lb) (227 kilograms (kg)). Do not stand or put arms, legs, or any body part under hoisted load. Do not permit engine to swing while hoisted. Failure to comply may cause injury or death to personnel.
- Engine assembly weighs approximately 160 lb (72 kg). Use suitable lifting device with the capacity to lift the weight of the engine assembly. Failure to comply may cause injury or death to personnel.
- When lifting generator set, use lifting equipment with minimum lifting capacity of 1,000 lb (453.6 kg). Do not stand or put arms, legs, or any body part under hoisted load. Do not permit generator set to swing. Failure to comply may cause injury or death to personnel.
- AC generator assembly weighs approximately 252-262 lb (114-119 kg). Use suitable lifting device with capacity to lift the weight of assembly. Do not stand or put arms, legs, or any body part under hoisted load. Failure to comply may cause injury or death to personnel.
- When lifting generator set, use lifting equipment with minimum lifting capacity of 1,100 lb (500 kg). Do not stand or put arms, legs, or any body part under hoisted load. Do not permit generator set to swing. Failure to comply may cause injury or death to personnel.
- Engine assembly weighs approximately 355 lb (161 kg). Use suitable lifting device with the capacity to lift the weight of the engine assembly. Failure to comply may cause injury or death to personnel.

WARNING SUMMARY – CONTINUED

WARNING



Operating

Starting engine when the unit is partially disassembled is dangerous. Run the engine in this condition only as long as required to test operation. Keep away from unprotected moving engine parts during operation. Failure to comply may cause injury or death to personnel.

WARNING



Sharp Object

Cooling fan has sharp blades. Use caution and wear gloves when removing or installing fan. Failure to comply may cause injury or death to personnel.

HAZARDOUS MATERIALS ICONS



CHEMICAL - Drops of liquid on hand shows that material will cause burns or irritation to human skin or tissue.



EXPLOSION - Rapidly expanding symbol shows that material may explode if subjected to high temperature, source of ignition, or high pressure.



EYE PROTECTION - Person with goggles shows that material will injure the eyes.



FIRE - Flame shows that material may ignite and cause burns.



POISON - Skull and crossbones show that material is poisonous or is a danger to life.

WARNING SUMMARY – CONTINUED



VAPOR - Human figure in a cloud shows that material vapors present a danger to life or health.

HAZARDOUS MATERIALS WARNING DESCRIPTIONS

There is a potential risk that soldiers and other users may be exposed to chemical substances and diesel engine exhaust during the operation, maintenance, and repair of the AMMPS generator sets.

Potential sources of chemical substances include fuels, oils, lubricants, paints, cleaners/solvents, engine coolant fluids, cold start fluid, fire extinguishing agents, battery acid/chemicals, and miscellaneous chemicals used during the setup/operation/maintenance and sustainment throughout the life-cycle of the AMMPS generator sets.

WARNING



This manual describes physical and chemical processes that may require the use of chemicals, solvents, paints, and/or other commercially available material. Users of the manual should obtain the Material Safety Data Sheets (MSDS), Occupational Safety and Health Act (OSHA) Form 20, or the equivalent from the manufacturers or suppliers of materials to be used. Failure to comply with all procedures, recommendations, warnings and cautions for safe use, handling, storage, and disposal of these materials may result in serious injury or death to personnel.

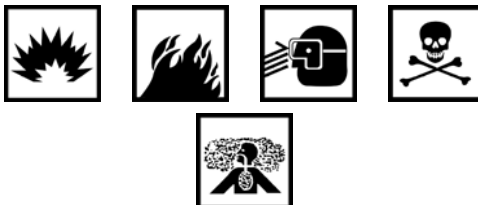
WARNING

Batteries

- Battery acid can cause burns to skin and cause eye injury. Wear safety goggles and chemical gloves and avoid acid splash while working on the batteries. Failure to comply may cause injury or death to personnel.
- Batteries give off combustible gas. Do not smoke or use open flame when performing maintenance. Failure to comply may cause injury or death to personnel and damage to equipment.
- Do not damage batteries. Storage batteries are filled with a liquid acid that can leak from sealed battery when case is broken. Contact with acidic liquid can burn skin and eyes. Wear safety goggles and chemical gloves and avoid acid splash while handling damaged batteries. Do not move batteries by terminals. Failure to comply may cause injury or death to personnel or damage to equipment.
- Lifting batteries may cause back strain. Ensure proper lifting techniques are used when lifting batteries. Failure to comply may cause injury or death to personnel.

WARNING SUMMARY – CONTINUED

WARNING



Cleaning

- Compound cleaning solvent is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection is required. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply may cause injury or death to personnel.
- Engine cooling system cleaning compound MIL-C-0010597F(ME) will not be used as a routine maintenance procedure each time antifreeze is added or drained from the cooling system. The compound will be used only when necessary to clean heavily rusted or partially clogged cooling systems. Failure to comply may cause injury or death to personnel.
- Engine cleaning compound MIL-C-0010597F(ME) for cooling systems is designed to clean the interiors of cooling systems, to neutralize residual cleaning acids, and to coat the interiors with a silicate. Failure to comply may cause injury or death to personnel.

WARNING

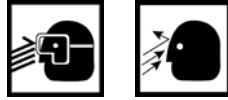


Exhaust

- Exhaust discharge contains deadly gases, including carbon monoxide. Exhaust gases are most dangerous in places with poor ventilation. Do not operate generator set in an enclosed area unless exhaust discharge is properly vented. Failure to comply may cause injury or death to personnel.
- Hot exhaust gases can ignite combustible materials. Allow room for safe discharge of hot gases. Failure to comply may cause injury or death to personnel.
- Exhaust gases are most dangerous in places with poor ventilation. The best defense against exhaust gas poisoning is very good ventilation. To protect yourself and others, always obey the following rules:
 - Do not run engine indoors unless you have very good ventilation.
 - Do not idle engine for a long time unless there is very good ventilation.
 - Be alert at all times. Check for smell of exhaust fumes.
 - Failure to comply may cause injury or death to personnel.
- Exhaust gas poisoning causes dizziness, headache, loss of muscle control, sleepiness, coma, and death. If anyone shows signs of exhaust gas poisoning, get all personnel clear of AMMPS. Make sure they have lots of fresh air. Keep them warm, calm, and inactive. Get medical help. If anyone stops breathing, give artificial respiration. Failure to comply may cause injury or death to personnel.

WARNING SUMMARY – CONTINUED

WARNING



Eye

- Flying debris or material may enter eyes or strike the face. Wear appropriate eye/face protection while performing maintenance tasks. Failure to comply may cause injury or death to personnel.
- Eye protection is required when working with compressed air. Do not use compressed air to clean skin. Do not aim at personnel. Compressed air can propel particles at high velocity and injure eyes. Failure to comply may cause injury or death to personnel.

WARNING



Fuel

- Never inject fuel near a fire source. Atomized fuel is highly combustible. Fuel pressure is high enough to penetrate skin. Ensure that spray from the injector nozzle is directed away from all personnel. Direct contact with spray can cause skin cell destruction and blood poisoning. Skin and eye protection are required when working in contact with fuel. Failure to comply may cause injury or death to personnel and damage to equipment.
- Fuels used in the generator set are combustible. Do not smoke or use open fire when performing maintenance. Fire and possible explosion may result. Failure to comply may cause injury or death to personnel and damage to equipment.
- Fuels used in the generator set are combustible. When filling the fuel tank, maintain metal-to-metal contact between filler nozzle and fuel tank opening to eliminate Electrostatic Discharge (**ESD**). Fire and possible explosion may occur. Failure to comply may cause injury or death to personnel.
- Fuel is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash exposed skin and change soaked clothing promptly if exposed to fuel. Failure to comply may cause injury or death to personnel.
- Fuels used in the generator set are combustible. Ensure fuel source grounding strap is connected to unit fuel fill grounding stud (fuel fill static ground). When filling the fuel tank, maintain metal-to-metal contact between filler nozzle and fuel tank opening to eliminate **ESD**. Fire and possible explosion can result. Failure to comply may cause injury or death to personnel.
- Do not operate generator set if any fuel leaks are present. Fuel is combustible. Always perform PMCS before operation. Failure to comply may cause injury or death to personnel.

WARNING SUMMARY – CONTINUED

- Make sure engine control switch is only set to PRIME & RUN during fuel system checks. Failure to comply may cause injury or death to personnel.
- Hot engine surfaces from engine and generator circuitry are possible sources of ignition. When hot refueling during unit operation with DF-1, DF-2, JP5, or JP8, avoid fuel splash and fuel spill. Do not smoke or use open flame when performing refueling. Remember PMCS are still required. Flames and possible explosion may result. Failure to comply may cause injury or death to personnel.

WARNING



High Temperature/Pressure

- Cooling system operates at high temperature and pressure. Contact with high-pressure steam and/or liquids can cause burns and scalding. Shut down generator set and allow system to cool before performing checks, services, and maintenance. Wear gloves, additional protective clothing, and goggles as required. Failure to comply may cause injury or death to personnel.
- Engine coolant is toxic to eyes and poisonous if ingested. Eye protection is required when working with engine coolant. Avoid repeated or prolonged contact. Failure to comply may cause injury or death to personnel.
- Hot coolant can burn. If the radiator cap is hot to the touch, it is too hot to open. Allow the coolant to cool before opening the radiator cap. Wear gloves, additional protective clothing, and goggles as required. Contact with high-pressure steam and/or liquids can cause burns and scalding. Failure to comply may cause injury or death to personnel.

WARNING



Noise

Hearing protection is required during maintenance or repair with engine running. Failure to comply can cause hearing loss.

LIST OF EFFECTIVE PAGES / WORK PACKAGES

NOTE: "SUPERSEDURE NOTICE" TM 9-6115-749-24&P dated 1 July 2016 supersedes TM 9-6115-749-24&P dated 31 January 2012, including all changes. Zero in the "Change No." column indicates an original page or work package.

Date of issue for the original manual is:

Original

1 July 2016

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FP-4 Blank	0		
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FP-6 Blank	0		
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FP-8 Blank	0		
FP-9	0		
FP-10 Blank	0		
FP-11	0		
FP-12 Blank	0		
Inside back cover	0		
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ARMY
AIR FORCE
MARINE CORPS
NAVY

*TM 9-6115-749-24&P
TO 35C2-3-531-2
TM 09292B-OI/1A
TM 7610-LL-L1A-0019

HEADQUARTERS, DEPARTMENTS OF THE ARMY, AIR FORCE, NAVY, AND HEADQUARTERS, U.S.
MARINE CORPS
Washington, D.C. 1 JULY 2016

TECHNICAL MANUAL

FIELD AND SUSTAINMENT MAINTENANCE MANUAL
INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST
FOR

GENERATOR SET, SKID MOUNTED 5 KW ADVANCED MEDIUM MOBILE POWER SOURCES (AMMPS)
04-1030, 50/60 Hz (NSN 6115-01-561-7329) (EIC MA2)
04-1031, 400 Hz (NSN 6115-01-561-7438)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Reports, as applicable by the requiring Service, should be submitted as follows:

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HOW TO USE THIS MANUAL

This manual contains field and sustainment maintenance instructions with Repair Parts and Special Tools List (RPSTL) for the 5 kW AMMPS skid-mounted generator sets, Mobile Electric Power (MEP)-1030 and MEP-1031.

This field and sustainment maintenance manual is part of a family of manuals which includes an operator's manual (TM 9-6115-749-10), an operator and field maintenance manual including Repair Parts and Special Tools List (RPSTL) manual for Power Units (PU) and Power Plants (PP) (TM 9-6115-755-13&P), and a National Maintenance Work Requirement (NMWR) maintenance manual.

NOTE

Throughout the family of manuals, generator set directional orientation is described from the point of view of the operator facing the operator's controls looking out over the generator set. From this perspective, the end of the generator set containing the operator's controls will be referred to as the rear of the generator set.

Manual Overview

This field and sustainment maintenance manual provides troubleshooting, PMCS, maintenance, parts information, and supporting information required to maintain and repair the AMMPS 5 kW generator set. Listed below are some of the features included in this TM to help locate and use the provided information.

WORK PACKAGES

This TM has been organized using the WP concept. Each chapter contains a series of WP rather than sections and paragraphs. Each WP is designed to stand alone as a complete information module. If you keep your section(s) of this TM in a loose-leaf binder, you will be able to remove just the WP needed to complete a specific task.

Each WP is numbered using a four-digit number beginning with WP 0001. WPs are numbered sequentially throughout the TM (e.g. WP 0022, WP 0023, etc.). The Table of Contents lists each chapter and WP title, as well as all figures and tables contained within each WP. Figures and tables are numbered sequentially within each WP.

The WP number is located at the top right of each page. It is also located at the bottom of the page with the WP page number included (0001-1 would be page 1 of the General Information WP (WP 0001, General Information)).

Each WP starts on a right-hand page. This is done so you can remove a single WP from the paper TM if needed for a task. Blank pages are assigned a number, but it appears on the preceding or following page. For example, if page 0001-10 of a WP is blank, page 0001-9 will have the number 0001-9/10 blank; or if page 0001-1 of a WP is blank, page 0001-2 will have the number 0001-1 blank/2.

Each task within a maintenance or troubleshooting WP contains step-by-step procedures and will end with the words END OF TASK, and each WP ends with the statement END OF WORK PACKAGE. Think of each WP as a small, stand-alone TM.

References to equipment placarding are printed as they appear on the equipment whenever possible. On-screen text is shown in brackets in the manual (i.e. [Ready to Crank]).

Warnings, Cautions and Notes Definitions

Warning, caution, and note headings, chapter titles, and paragraph headings are printed in bold type. Multiple warning, caution, or note paragraphs may appear above a procedure, task, or step with one warning, caution, or note heading. Prior to starting a WP, all warnings included in the WP should be reviewed, understood, and followed. Review the materials/parts in the initial setup of the WP for any hazardous materials used during maintenance of the equipment. Then refer to the detailed warnings for hazardous materials in the Warning Summary. Make sure to read all warnings within referenced WP that are required to complete tasks.

HOW TO USE THIS MANUAL – CONTINUED

WARNING

Warning highlights an essential operating or maintenance procedure, practice, condition, statement, etc., which, if not strictly observed, could result in injury to, or death of, personnel or long-term health hazards.

CAUTION

Caution highlights an essential operating or maintenance procedure, practice, condition, statement, etc., which, if not strictly observed, could result in damage to, or destruction of, equipment or loss of mission effectiveness.

NOTE

Note highlights an essential operating or maintenance procedure, condition, or statement.

TM CONTENT

Front Matter

The front cover of the manual identifies the exact model(s) covered by this manual. Be certain the generator set you are working on is covered by the information in the manual. Additional manuals will be required to provide information on models not covered by this manual.

The List of Effective Pages/WPs provides a list of pages/WPs that have been modified from a previous edition of the manual.

The Table of Contents will help you understand the organization of the manual. The overall Table of Contents in the front of the manual directs you to chapters and lists all WPs in the manual with tables and figures identified for each WP. The chapters contain descriptive information, maintenance procedures organized by maintenance level, and supporting data. Each chapter is divided into WPs with titles that describe the information or procedure in the WP. Each chapter contains its own chapter index that lists all the WPs within the chapter to help you find information.

Chapter 1 - General Information, Equipment Description, and Theory of Operation

The General Information WP (WP 0001, General Information) provides general information including characteristics, capabilities, features, and theory of operation for the AMMPS and its major components. It contains a nomenclature cross-reference list, a list of abbreviations and acronyms used in this TM, general information about this manual, and the related forms and records. Instructions are provided for making equipment improvement and recommendations. Coverage includes a reference to the manual that contains instructions on destruction of materiel to prevent enemy use.

The Equipment Description and Data WP (WP 0002, Equipment Description and Data) describes the characteristics, capabilities, and features of the generator set and provides information on location and description of major components.

The Theory of Operation WP (WP 0003, Theory of Operation) provides an overview of the operation of the generator set.

Chapter 2 - Field Maintenance Troubleshooting

The AMMPS generator set provides electronic troubleshooting through the Digital Control System (DCS). If a malfunction occurs or is about to occur to a component monitored by the DCS, a fault or warning code is displayed on the DCS screen at the rear of the generator set. This fault and warning information, along with manual troubleshooting guidelines, provide a comprehensive level of information to identify problems that may occur with the generator set and minimize downtime for repair.

An index organized by system (WP 0004, Troubleshooting Index) linking potential problems to troubleshooting WPs is provided for a quick reference.

HOW TO USE THIS MANUAL – CONTINUED

The Operational Checkout WP (WP 0005, Operational Checkout) provides procedures to ensure the AMMPS 5 kW generator set is capable of performing as required and provides corrective action steps to take if it is not.

The warnings and fault codes displayed on the DCS screen are identified in the Warning and Fault Codes WP (WP 0006, Warning and Fault Codes).

WP 0007 through WP 0013 are used to troubleshoot problems with the major systems of the generator set (engine, electrical system, winterization kit, etc.). See the Table of Contents for specific WP numbers and titles for each system.

Chapter 3 - Field Maintenance Instructions

The service procedures required to be performed when a generator set is first received in the field are described in the Service Upon Receipt WP (WP 0014, Service Upon Receipt).

Every generator set requires some periodic scheduled maintenance. The theory of the scheduled maintenance or PMCS is outlined in Field PMCS Introduction WP (WP 0015, Field PMCS Introduction). A detailed table to guide through the scheduled maintenance tasks is provided by Field PMCS WP (WP 0016, Field PMCS, Including Lubrication Instructions).

Detailed instructions for removal, installation, test, and adjustment of critical components (Line Replaceable Units (LRUs)) of the generator set are the subject of WP 0017 through WP 0086. See the Table of Contents for specific WP numbers and titles for each LRU.

Each field maintenance WP begins with an initial setup table that contains information about the test equipment, tools and special tools, equipment condition, materials/parts, reference WPs and manuals, and personnel required to perform each task.

Specific lubrication instructions are found in Lubrication Instructions WP (WP 0087, Lubrication Instructions).

If the design engineers responsible for the AMMPS generator set have specified a critical torque value for tightening fasteners, that value will be stated in the field maintenance WP for the appropriate LRU. Otherwise, information for nominal torque values of common U.S. standard units and metric hardware is provided in the Torque Limits WP (WP 0088, Torque Limits).

Chapter 4 - Sustainment Troubleshooting Procedures

All troubleshooting procedures for the AMMPS generator set will be handled at the field maintenance level.

Chapter 5 - Sustainment Maintenance Instructions

Maintenance tasks not specific to AMMPS generator sets but common to many types of equipment may be listed in the General Maintenance WP (WP 0093, General Maintenance).

Most maintenance tasks required above field maintenance level will be performed at NMWR level. However, detailed instructions for removal, installation, test, and adjustment of some critical components (LRU) of the generator set are the subject of WP 0094 through WP 0096. See the Table of Contents for specific WP numbers and titles for each LRU.

Large size electrical diagrams and drawings, such as schematics, are found in the Foldout Pages section in Rear Matter.

Chapter 6 - Parts Information

The Repair Parts and Special Tools List (RPSTL) contains parts that support both field and sustainment maintenance. This chapter covers WP 0098 through WP 0159. The repair parts lists (WP 0099 through WP 0155) itemize all available parts required to maintain and repair the generator set.

The Special Tools List WP (WP 0157, Special Tools List) provides information on special tools, special Test, Measurement, and Diagnostic Equipment (TMDE), and other special support equipment authorized for maintenance of the AMMPS generator set. Bulk items (WP 0156, Bulk Items), National Stock Numbers (NSN) (WP 0158, NSN Index), and Part Number (P/N) (WP 0159, P/N Index) indexes are included in the other WPs in this chapter.

Chapter 7 - Supporting Information

HOW TO USE THIS MANUAL – CONTINUED

The supporting information chapter provides the Maintenance Allocation Chart (MAC) (WP 0162, Standard Two-Level MAC) that lists the proper level of maintenance where critical tasks are to be performed. The MAC also provides a list of all tools, kits, and test equipment, both special and common, required to maintain the AMMPS 5 kW generator set.

Other WPs found in this chapter list commonly used supplies (WP 0163, Expendable and Durable Items List) and referenced material (WP 0160, References) used throughout this TM.

Rear Matter

Rear Matter includes a Glossary to define terms and phrases which are uncommon and not identified within the manual or within a standard dictionary.

The Department of the Army DA Form 2028, Recommended Changes to Publications and Blank Forms, is the document to be submitted to correct errors found in the manual or to make recommended changes that will improve the manual.

Large size electrical diagrams and drawings, such as schematics, are located in the Foldout Pages section at the rear of this manual.

Rear Matter also provides a conversion chart between SAE and metric values.

CHAPTER 1

FIELD AND SUSTAINMENT GENERAL INFORMATION, EQUIPMENT DESCRIPTION AND THEORY OF OPERATION FOR AMMPS 5 KW GENERATOR SET

GENERAL INFORMATION

SCOPE

This field and sustainment maintenance including repair parts and special tools list manual contains instructions for troubleshooting and maintaining the AMMPS 5 kW generator set.

Type of Manual

Field and sustainment maintenance including repair parts and special tools list.

Model Number(s) and Equipment Name(s)

AMMPS 5 kW 50/60 and 400 hertz (Hz) generator set, skid mounted (Table 1):

Table 1. Model Number(s) and Equipment Name(s).

MODEL	HERTZ	NSN
04-1030	50/60	6115-01-561-7329
04-1031	400	6115-01-561-7438

Purpose of Equipment

The AMMPS 5 kW generator set is designed to provide tactical quiet, Alternating Current (AC) power in a combat setting. The generator set is designed for ease of transportation, operation, and maintenance. The Kubota D902-IV C engine supplied with the AMMPS 5 kW generator set eliminates wetstacking problems.

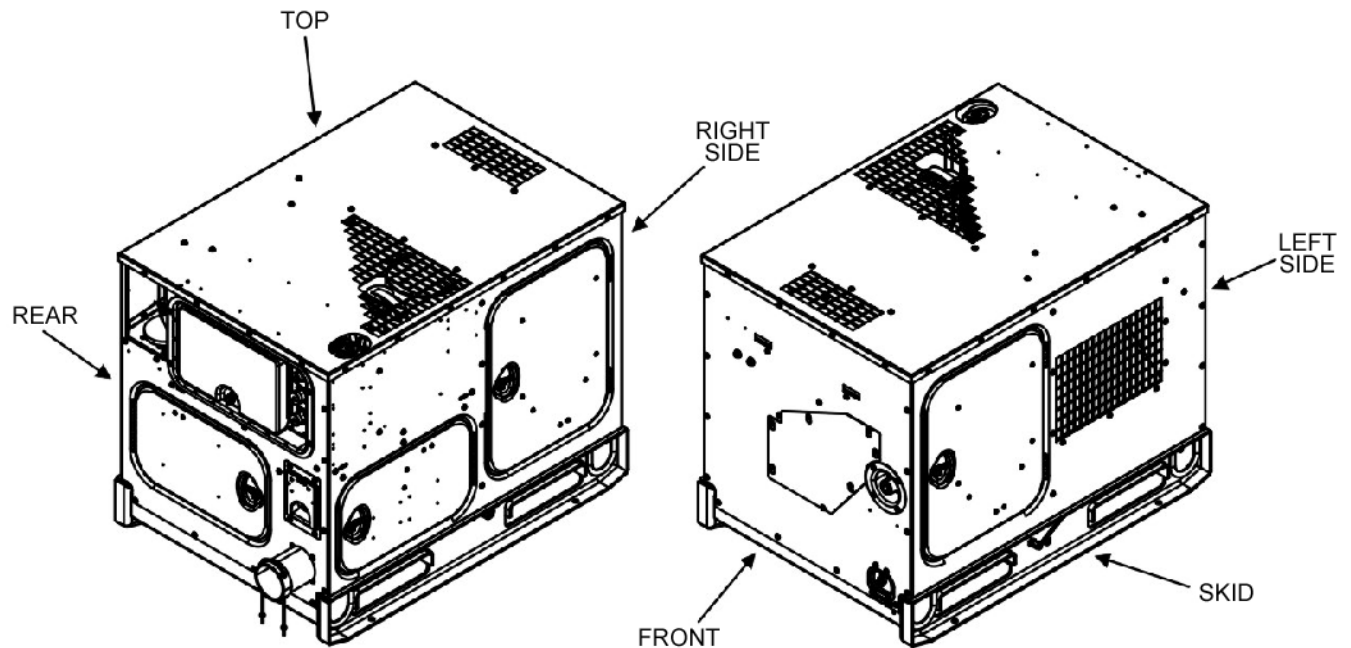


Figure 1. Skid-Mounted 5 kW AMMPS Generator Set.

MAINTENANCE FORMS, RECORDS, AND REPORTS

- (1) (A) Department of the Army forms and procedures used for equipment maintenance will be those prescribed by (as applicable) DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual; DA PAM 738-751, Functional Users Manual for the Army Maintenance Management Systems - Aviation (TAMMS-A); or AR 700-138, Army Logistics Readiness and Sustainability.

MAINTENANCE FORMS, RECORDS, AND REPORTS – CONTINUED

- (2) (MC) Maintenance forms and records used by Marine Corps personnel are prescribed by TM 4700-15/1.
- (3) (AF) Maintenance forms and records used by Air Force personnel are prescribed in AFI 21-101 and the applicable TO 00-20 Series Technical Orders.
- (4) (N) Navy users should refer to their service peculiar directives to determine applicable maintenance forms and records to be used.

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

(1) (A) If your generator set needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. If you have Internet access, the easiest and fastest way to report problems or suggestions is to follow the instructions and links below:

If you have a user's account you can submit the PQDR for ALL CECOM (B16) Warranty, EIR and PQDRs (including those B16 Aviation related) through the Navy's Web Product Quality Deficiency Reporting (PQDR) site, https://www.pdrep.csd.disa.mil/pdrep_files/report_tools/pqdr.htm. If you do not, either go to EZ PQDR, <https://pdrep.csd.disa.mil/pdrep/ezdr.doc>, and input your PQDR there or establish a new account. New accounts can be established at https://www.pdrep.csd.disa.mil/pdrep_files/accessforms/useraccess.htm and selecting the "User Access Request" link on the left side of the web page.

CECOM (B16) aviation PQDRs will not go to AMCOMs Joint Deficiency Reporting System (JDRS). If AMCOM should get a CECOM aviation PQDR they will re-direct it to the CECOM PQDR Team.

Use the PQDR for Warranties, EIRs and PQDRs. There is a block on the PQDR that can be clicked if it is a Warranty. The originator can still put in the description that they want this investigated as an EIR and then enter what the issue is.

You may also submit your SF 368 (Product Quality Deficiency Report) via email (usarmy.apg.cecom.mbx.lrc-leob16-pqdr-support-team@mail.mil), facsimile (443-861-6356) or regular mail (call 443-861-6310 or 443-861-6311 or 443-861-6312) for the current mailing address).

We will send you a reply.

- (2) (AF) Air Force personnel are encouraged to submit EIR's in accordance with AFI 38-401.
- (3) (N) Navy personnel are encouraged to submit EIR's through their local Beneficial Suggestion Program.
- (4) (MC) For Marine Corps users: Quality deficiency reports (QDR) shall be submitted on SF 368 in accordance with MCO 4855.10. A reply will be furnished to you.

CORROSION PREVENTION AND CONTROL (CPC)

Corrosion Prevention and Control (CPC) of Army materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future items. Corrosion specifically occurs with metals. It is an electrochemical process that causes the degradation of metals. It is commonly caused by exposure to moisture, acids, bases, or salts. An example is the rusting of iron. Corrosion damage in metals can be seen, depending on the metal, as tarnishing, pitting, fogging, surface residue, and/or cracking. Plastics, composites, and rubbers can also degrade. Degradation is caused by thermal (heat), oxidation (oxygen), solvation (solvents), or photolytic (light, typically UV) processes. The most common exposures are excessive heat or light. Damage from these processes will appear as cracking, softening, swelling, and/or breaking. SF 368, Product Quality Deficiency Report should be submitted to the address specified in DA PAM 750-8, The Army Maintenance Management System (TAMMS) User's Manual.

For **aircraft TMs**, this information shall include a reference to TM 1-1500-344-23, volumes 1 through 4 (Cleaning and Corrosion Control).

OZONE-DEPLETING SUBSTANCES (ODS)

The use of Class 1 Ozone Depleting Substances (ODS) for new acquisitions has been curtailed by Section 326 of the National Defense Authorization Act of Fiscal Year 1993 (Public Law 102, 484) and related Army policy. ODS are listed in Title VI of the Clean Air Act. For systems procured and fielded prior to the effectiveness of the above law (June 1993) that use a Class 1 ODS, a listing of those substances required to operate and maintain the system shall be included in the TM. This requirement applies to any system procured or fielded after June 1993 that requires the use of a Class 1 ODS, where the use of the ODS has been properly documented and waived. The procuring activity will provide a list of Class 1 ODS on request.

DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

Destruction of Army Electronics Materiel to Prevent Enemy Use (Electronics Command) shall be in accordance with TM 750-244-2.

Destruction of Air Force material to prevent enemy use shall be IAW AFI 33-201V2.

Destruction of Navy material to prevent enemy use shall be IAW Navy direction.

Destruction of Marine Corps materiel to prevent enemy use shall be IAW MC direction.

DEMOLITION OF MARINE CORPS MATERIEL TO PREVENT ENEMY USE

Demolition to Render the Generator Set Inoperative

1. When capture or abandonment of the generator set to an enemy is imminent, the responsible unit commander must make the decision to either destroy or render the equipment inoperative.
2. Based on this decision, orders are issued which cover the desired extent of destruction.
 - a. Operators should be thoroughly familiar with all methods of destruction without referencing any particular manual.
 - b. Demolition of the generator set can be accomplished by explosives, fire, or tools such as a sledge hammer, pick, or ax. Demolition can also be accomplished by misuse.
3. The method used will depend on the time available and the availability of these materials in the vicinity of the generator set.
4. Demolition by mechanical means:
 - a. Use hammer, pick, ax, or any other available tool to destroy vital engine and control parts.
 - b. Control box, fuel injection lines, and the radiator should be smashed, engine and control box wires pulled and cut, and any other external engine components (fuel filter, alternator) should be damaged enough to make them inoperable.
5. Demolition by misuse:
 - a. Drain diesel generator crankcase oil.
 - b. Block diesel generator engine air supply ports.
 - c. Start diesel generator engine and allow it to operate until it fails.
 - d. Switch Battleshort into the ON position.
 - e. Pour sand, dirt, or other available abrasive compound in all exposed surfaces and access ports of the diesel engine and generator.
 - f. Drain engine coolant.

DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE – CONTINUED

6. Demolition by burning: Complete as much mechanical damage as possible, and then saturate unit with combustible fuel and ignite.
7. Demolition by explosives: Place explosive charges in priority order (Table 2).

Table 2. Demolition Priority Levels.

PRIORITY LEVEL	COMPONENT	EXPLOSIVE CHARGE REQUIRED
1	Generator Engine	1 pound (lb) (0.45 kilograms (kg))
2	Control Box	1 lb (0.45 kg)
3	Generator Housing	1 lb (0.45 kg)
4	Housing/Structure	2 lb (0.90 kg)

PREPARATION FOR STORAGE OR SHIPMENT

Administrative storage of equipment issued to and used by Army activities will have Preventive Maintenance Checks and Services (PMCS) performed before storing. When removing the equipment from administrative storage, the PMCS checks should be performed to assure operational readiness.

WARRANTY INFORMATION

1. The AMMPS 5 kW generator set is warranted for 1,800 hours (h) of operation or 36 months, whichever occurs first. The warranty starts on the date the equipment is accepted in the "Wide Area Work Flow" system as defined on the Date Inspected block and the Date Manufactured block on the generator set data plate. The warranty block on the data plate contains the warranty period (hours/time limit) that the warranty covers. This warranty shall include furnishing of new items to replace any that prove to be nonconforming and/or defect within the warranty period. Such items shall be returned to the contractor's plant without cost to the Government.

The warranty is not an appropriate vehicle for maintaining readiness of AMMPS generator sets. The normal supply system should be used to maintain readiness. Parts provided in response to warranty claims should be used to replenish your supply stocks.

The Contractor, Cummins Power Generation (CPG), guarantees the supplies and parts at the time of acceptance or delivery conform to the design and manufacturing requirements, are free from all defects in materials and workmanship, and conform to all performance requirements delineated in the applicable specifications of the contract. This guarantee will be for 1,800 operating hours on each unit, or 36 months, whichever occurs first.

The guarantee shall include furnishing of new items to replace any that prove to be nonconforming and/or defective within the warranty period. Such items shall be furnished without cost to the Government. When repair or replacement requires transportation of the nonconforming or defective items, shipping cost from the line item delivery point (irrespective of the Foreign Operating Base (F.O.B.) point or the point of acceptance) to the Contractor's plant and return shall be at the expense of the Contractor.

2. The Government activity responsible for administrative functions of the warranty program is the Commander, US Army CECOM LCMC, Attn: AMSEL-LC-LEO-DSS-PQ Aberdeen, W15GK8. Call or send message to voice (443) 861-6310 or DSN 848-6310 or (443) 861-6313 or DSN 848-6313; FAX (443) 861-6356 or (443) 861-6356. Email: AMSEL-LC-LEO-D-CSCFO@conus.army.mil. The following paragraphs describe the responsibilities of each Government activity.

WARRANTY INFORMATION – CONTINUED

- a. Failure to follow published maintenance procedures at the maintenance levels specified in the appropriate technical manual could result in a warranty claim being declared invalid. The following maintenance requirements must be performed: Preventive Maintenance Checks and Services (PMCS). All PMCS requirements are contained in the Operator's Manual (TM 9-6115-749-10) and the Field and Sustainment Maintenance Manual (TM 9-6115-749-24&P). Corrective maintenance for the equipment is given in TM 9-6115-749-24&P based upon the approved Maintenance Allocation Chart (MAC). Any deviation from the normal maintenance and repair procedures is not authorized.
- b. The owning unit is responsible for operating and maintaining the generator sets in accordance with the technical manuals. All PMCS and lubrication order requirements must be met. In addition, all operating procedures will be strictly followed while observing all warnings, cautions, and notes. Upon experiencing a warranty-related failure, the owning unit shall prepare the required documentation.
- c. Warranty Control Office Responsibilities. CECOM Warranty Control Office (WARCO) will handle all warranty claims generated by field units with exception of FMS customers. WARCO will determine whether or not each claim is a candidate for warranty consideration. The Government will initiate Warranty Claim Actions (WCA) for warranty items and Quality Deficiency Reports (QDR) for systematic failures in accordance with DA PAM 750-8 and this Technical Bulletin. CECOM WARCO will coordinate warranty claims with CECOM Contracting Officer as appropriate. FMS customers will administer their own WCA and QDRs.
- d. Army Oil Analysis Program (AOAP). There are no warranty components of the generator set enrolled in the AOAP.
- e. Alteration/Modifications. Alterations and modifications shall not be made unless expressly authorized or directed by: PM-MEP.
3. Nullification. The following examples of actions which will nullify the warranty are examples only and are not inclusive and do not alter the terms of the contract warranty provisions.
 - a. Any maintenance/repair procedure, improper use or operation, abuse, improper environmental exposure, and installation methods which are outside of the published guidelines and procedures contained in the technical manuals can be cause for nullifying a warranty claim.
 - b. In addition, the following actions will be cause for nullification of the warranty:
 - (1) Subsequent damage to components as a result of continued use after a component malfunction.
 - (2) Damage caused by combat conditions or acts of war.
 - (3) Operation of the unit with the BATTLESORT switch on.
 - (4) Operation of the unit in an environment beyond that specified in the Operator's Technical Manual (TM 9-6115-749-10).
 - (5) Installation of equipment not in accordance with the technical manuals.
 - (6) Any abuse such as improper use, repair, or handling of warranted items.
 - (7) Any damage caused by (1) acts of God or the public enemy, (2) acts of the Government in either its sovereign or contractual capacity, (3) fires, (4) floods, or (5) unusually severe weather beyond the performance specifications.
 - (8) Use of improper or contaminated fuels, coolants, or lubricants.
 - c. Abuse Determination. In cases where generator set abuse is suspected (i.e., not obvious), the CECOM WARCO or Prime Contractor shall initiate an inquiry into the circumstances leading up to the generator set failure. This warranty is void for any generator set for which abuse is determined. The generator set may be returned to a functional condition by performing the necessary repair procedures in TM 9-6115-749-24&P.
4. Claim Procedures. The following procedures provide instructions for processing warranty claims (refer to DA PAM 750-8).
 - a. Identification of Failed Items. Generator set components that experience a warranty failure shall be tagged/identified to prevent improper repair or use. Tag the generator set component with an Exchange Tag, DA Form 2402 and complete the SF 368 form (refer to DA PAM 750-8). There are no items requiring special handling, storage, or shipment during the processing or warranty claims.

WARRANTY INFORMATION – CONTINUED

Warranty claims can be electronically submitted through the NAVSEA (Naval Sea Systems Command (NAVSEA)) website under Submit Quality Deficiency Reports. The Website is located at <http://www.nslcptsmh.csd.disa.mil/>.

- b. Disposition. Upon notification by CECOM WARCO that the item is to be returned to the Contractor, the using activity will package and return in accordance with the disposition instructions provided by the CECOM WARCO. A copy of the Product Quality Deficiency Report, SF 368 (refer to DA PAM 750-8) will be forwarded with the failed item.

The using activity will also visually inspect the repaired part for evidence of physical damage incurred during shipping. No item testing will be required to ensure that the component was repaired properly. The Contractor assumes all responsibility for testing after repair.

- c. Reimbursement for Army Repair. Reimbursement for Army repair is not authorized by this warranty.
- d. Claim Denials/Disputes. Claim denials or disputes will be coordinated through the Contractor Warranty Administrator and the CECOM WARCO.
- e. Reporting. Reporting or recording action on a failed item shall be as specified in DA PAM 750-8. Contractor unique forms shall not be used.

NOMENCLATURE CROSS-REFERENCE LIST

Shortened nomenclature is used in this manual to make procedures easier to read. A cross-reference between the shortened, common name used in this manual and the official nomenclature is provided below.

Common Name	Official Nomenclature
24 VDC Electricalal System	DC Electricalal System
24 VDC Electricalal System	Engine Electrical System
5 kW Genset	5 kW Generator Set
AC Generator	AC Generator Assembly
CBRN	Chemical, Biological, Radiological, Nuclear
Cylinder Head	Cylinder Head Assembly
DCS	Control Box Assembly
DCS	Control Box
DCS Mounting Bracket	Control Box Frame
DCS Mounting Bracket	Control Box Side Panels
DCS Mounting Bracket	Control Box Tray
DCS Wiring Harness	Control Box Wiring Harness
Dipstick	Oil-Level Bayonet Gauge
Doors	Access Doors
Engine Block	Main Bearing Case Assembly
Engine Block	Short Block
Engine Block Assembly	Crankcase Assembly
Engine Block Assembly	Short Block Assembly
Flywheel	Flywheel Assembly
Front Body Panel	Front Housing Section
Fuel Injection System	Engine Fuel System
Gear Case	Gear Case Assembly
Housing	Housing Assembly
Not used	Engine Accessories
Not used	End Bell Assembly
Oil Drain Hose Assembly	Oil Drain Assembly
Operator Control Panel	Main Control Panel
Output Box Assembly	Output Box

NOMENCLATURE CROSS-REFERENCE LIST – CONTINUED

Output Box Harness	Output Box Harness And Cables
Output Terminal Board	Output Load Terminal Board
Rear Body Panel	Rear Housing Section
Rectifier	Rectifier Assembly
Speed Governor	Governor System
Starter	Starter Assembly
Top Body Panel	Top Housing Section
Unit Skid	Skid Assembly

LIST OF ABBREVIATIONS/ACRONYMS

Acronyms and abbreviations used in this manual are provided and defined below.

Abbreviation/Acronym	Definition
%	Percent
+	Positive
-	Negative
A	Army
A	Ampere
AAL	Additional Authorization List
AC	Alternating Current
ADC	Amperes Direct Current
AF	Air Force
AFI	Air Force Instruction
AFR	Air Force Regulation
AFTO	Air Force Technical Order
AGM	Absorbed Glass Mat
AM-VM	Ampere Meter - Voltage Meter
AMMPS	Advanced Medium Mobile Power Sources
AOAP	Army Oil Analysis Program
AR	Army Regulation
AUX	CONTACT Auxiliary Contact
AVR	Automatic Voltage Regulation
Ah	Ampere Hour
Aux	Auxiliary
BII	Basic Issue Items
BOI	Basis of Issue
C	Crew (level of maintenance)
CAGEC	Commercial And Government Entity Code
CARC	Chemical Agent Resistant Coating
CB	Circuit Breaker
CECOM LCMC	Communications-Electronics Command Life Cycle Management Command
CPC	Corrosion Prevention and Control
CPG	Cummins Power Generation
CSV	Comma-Separated Values
CT	Current Transformer
CTA	Common Table of Allowances
CTL	Control
Cyl	Cylinder
D	Depot (level of maintenance)
DA	Department of the Army
DC	Direct Current
DCS	Digital Control System

LIST OF ABBREVIATIONS/ACRONYMS – CONTINUED

DD	Department of Defense (forms only)
DF	Diesel Fuel
DI	Direct Injection
DS2	Decontamination Solution Number 2
DoD	Department of Defense
E	Empty
E-Stop	Emergency Stop
ECP	Engineering Change Proposal
EIR	Equipment Improvement Recommendation
EMP	Electromagnetic Pulse
ESC	Equipment Service Criteria
ESD	Electrostatic Discharge
EX	Exhaust
F	Field (Level of Maintenance)
F	Full
F.O.B.	Foreign Operating Base
FGC	Functional Group Code
FM	Field Manual
Fig.	Figure
GFCI	Ground Fault Circuit Interrupter
GFI	Ground Fault Interrupter
GMTK	General Mechanic's Tool Kit
GND	Ground
Genset	Generator Set
Glow plg	Glow Plug
Gov	Governor
H	Below Depot (level of maintenance)
Hz	Hertz
IAW	In Accordance With
IBM	International Business Machine
ID	Identification
IN	Intake
IUID	Individual Unit Identification
JDRS	Joint Deficiency Reporting System
JP	Jet Propulsion Fuel
L	Liter
L-L	Line-To-Line
L-N	Line-To-Neutral
L/h	Liters Per Hour
LCD	Liquid Crystal Display
LRU	Line Replaceable Unit
MAC	Maintenance Allocation Chart
MC	Marine Corps
MCO	Marine Corps Order
MEP	Mobile Electric Power
MG	Mobile Generator
MPa	MegaPascals
MSD	Maintenance Support Device
MSDS	Material Safety Data Sheets
MTOE	Modified Table of Organization and Equipment
MWO	Modified Work Order
MΩ	Megohm

LIST OF ABBREVIATIONS/ACRONYMS – CONTINUED

N	Navy
N	Neutral
N/A	Not Applicable
NATO	North Atlantic Treaty Organization
NAVSEA	Naval Sea Systems Command
NEMA	National Electrical Manufacturers Association
NHA	Next Higher Assembly
NIIN	National Item Identification Number
NMWR	National Maintenance Work Requirement
NSN	National Stock Number
No.	Number
N•m	Newton meter
ODS	Ozone-Depleting Substances
OEM	Original Equipment Manufacture
ORR	Out of Range
OSHA	Occupational Safety And Health Act
P/N	Part Number
PAM	Pamphlet
PC	Personal Computer
PDA	Personal Data Assistant
PH	Phase
PMCS	Preventive Maintenance Checks And Services
PMG	Permanent Magnet Generator
PP	Power Plant
PQDR	Product Quality Deficiency Report
PU	Power Unit
PWM	Pulse Width Modulated
Press	Pressure
QDR	Quality Deficiency Report
Qty	Quantity
Qty. Recm.	Quantity Recommended
Qty. Rqr.	Quantity Required
RP	Relay Panel
RPSTL	Repair Parts And Special Tools List
RTC	Real Time Clock
SAE	Society of Automotive Engineers
SF	Standard Form
SMR	Source, Maintenance, And Recoverability
SOP	Standard Operating Procedure
SRA	Specialized Repair Activity
STB	Super-Tropical Bleach
TAMMS	The Army Maintenance Management System
TAMMS-A	The Army Maintenance Management System — Aviation
TBD	To Be Determined
TDA	Tactical Decision Aid
TDC	Top Dead Center
TDR	Transportation Discrepancy Report
TM	Technical Manual
TMDE	Test, Measurement, and Diagnostic Equipment
TO	Technical Order
Temp	Temperature
U/I	Unit of Issue

LIST OF ABBREVIATIONS/ACRONYMS – CONTINUED

UOC	Usable On Code
USB	Universal Serial Bus
UV	Ultraviolet
V	Volt
VAC	Volts Alternating Current
VDC	Volts Direct Current
WARCO	Warranty Control Office
WP	Work Package
Wtr	Winterization
cm	Centimeters
cm ³	Cubic Centimeters
e-mail	Electronic Mail
ea.	Each
ft	Foot
ft•lb	Foot-Pound
gal	Gallon
gal/h	Gallon Per Hour
h	Hour
in	Inch
in ³	Cubic inches
in•lb	Inch-pound
kPa	Kilopascal
kVA	Kilovolt-Ampere
kW	Kilowatt
kg	Kilogram
kΩ	Kilohm
lb	Pound
m	Meter
mA	Milliampere
mL	Milliliter
min	Minute
mm	Millimeter
ms	Millisecond
oz	Ounces
psi	Pounds per Square Inch
qt	Quart
rpm	Revolutions Per Minute
sec	Second
°	Degree
°C	Degree Celsius
°F	Degree Fahrenheit
±	Plus or Minus
Ω	ohm

QUALITY OF MATERIAL

Material used for replacement, repair, or modification must meet the requirements of this AMMPS 5 kW generator set field and sustainment maintenance manual. If quality of material requirements is not stated in this field and sustainment maintenance manual, the material must meet the requirements of the drawings, standards, specifications, or approved Engineering Change Proposals (ECP) applicable to the subject equipment.

SAFETY, CARE, AND HANDLING

ESD. The AMMPS 5 kW generator set contains no radioactive components or parts or radioactive material requiring special handling or consideration. The AMMPS 5 kW generator set DCS contains printed circuit boards and control cards requiring special handling to protect them from ESD when being serviced. The operator does not need to use special handling for operation of the AMMPS 5 kW generator set.

This manual describes physical and chemical processes that may require the use of chemicals, solvents, paints, or other commercially available materials. Users of the manual should obtain the Material Safety Data Sheets (MSDS) (OSHA Form 20 or equivalent) from the manufacturers or suppliers of materials to be used. Users must be completely familiar with manufacturer/supplier information and adhere to their procedures, recommendations, warnings, and cautions for safe use, handling, storage, and disposal of these materials.

END OF WORK PACKAGE

EQUIPMENT DESCRIPTION AND DATA

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

The AMMPS 5 kW generator set (Figure 1) is a fully-enclosed, self-contained, skid-mounted mobile unit. The generator set consists of six major assemblies: engine assembly, internal fuel assembly, external fuel assembly (not shown), AC generator assembly, Digital Control System (DCS), and output box assembly. An optional winterization kit is available for installation in cold weather climates.

The AMMPS 5 kW generator set is designed to accommodate the continuing proliferation of electronics (computers, Personal Data Assistants (PDA), etc.), life support systems, and global communications necessary in today's battlefield that require a continuous, uninterrupted flow of electricity to accommodate all tactical situations.

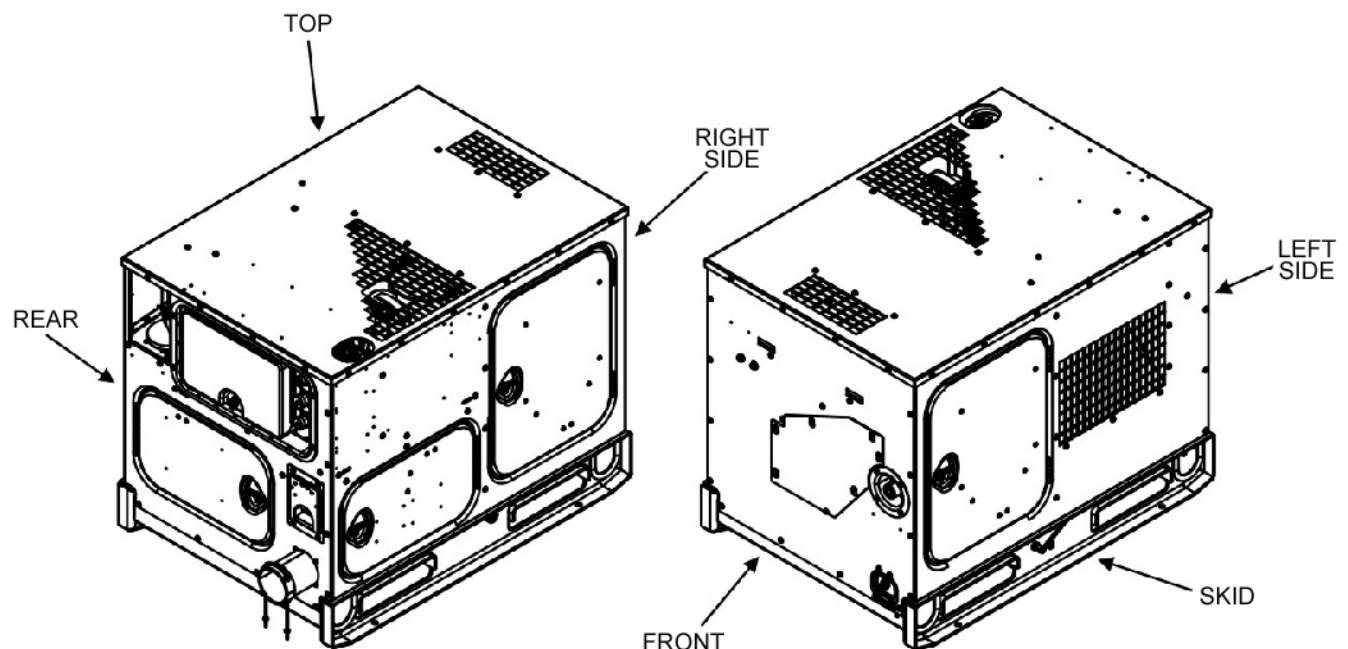
LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

Figure 1. AMMPS 5 kW Generator Set with Doors Closed.

HOUSING

An aluminum housing, consisting of several individual body panels, encloses the AMMPS 5 kW generator set and protects it from the environment. The housing provides acoustical protection, entry access to generator set assemblies, control of air flow over internal surfaces, and mounting for generator set components.

The aluminum housing is durable enough so that no damage should occur with normal usage. The housing design prevents the invasion of wind-driven rain, snow, and sand to the units' interior and the placement of a rain cap protects the exhaust. The Chemical Agent Resistant Coating (CARC) paint, polyurethane coating on circuit boards, sealed connectors, and immersion-proof fan motor housing provide additional protection against moisture and condensation damage.

Self-supporting hinged doors allow easy interior access for scheduled service and preventive maintenance. Individual body panels are removable to allow additional access for service and replacement of major components.

Body Panels

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS – CONTINUED

All body panels are connected using corrosion-resistant captive nuts. All seals are interference fit to the housing panels.

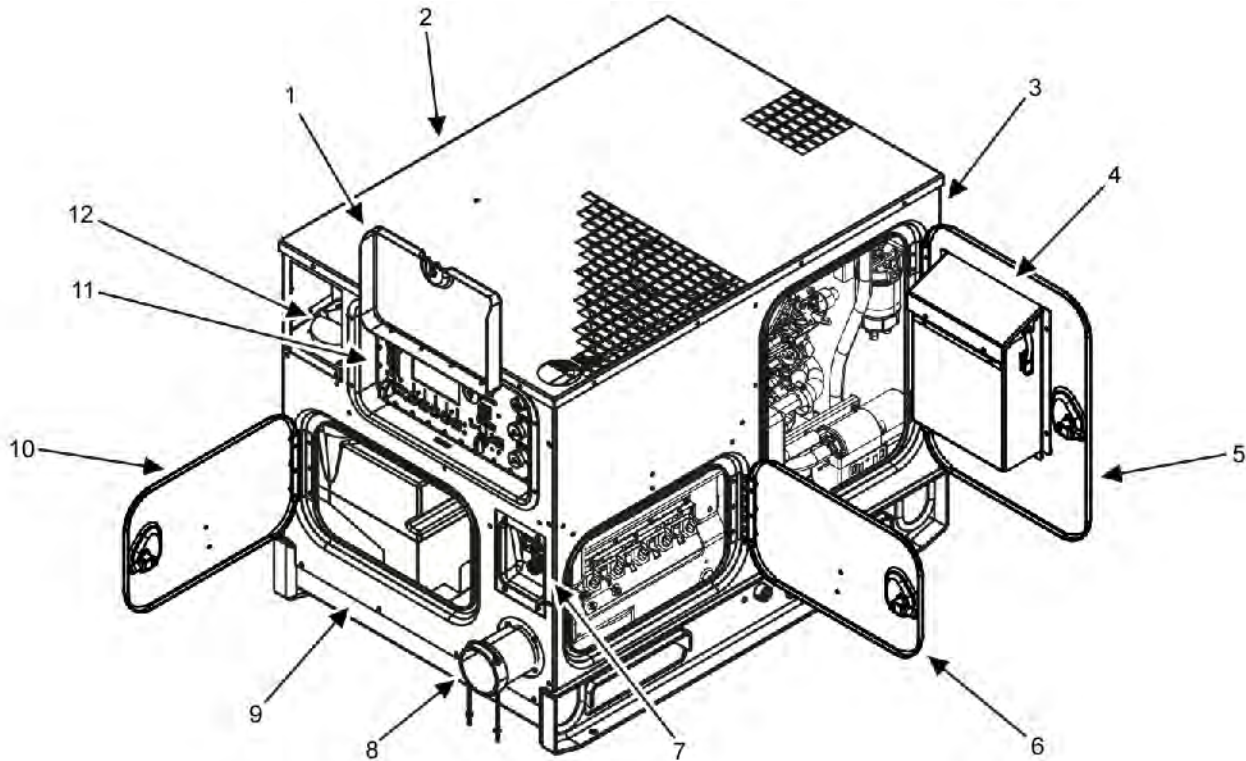


Figure 2. Rear and Right-Side View with Doors Open.

Top Body Panel (Figure 2, Item 2). The top body panel shields components from the elements.

Rear Body Panel (Figure 2, Item 9). The rear body panel is located at the rear of the generator set and contains the DCS access door (Figure 2, Item 1), DCS (Figure 2, Item 11), rear access door (Figure 2, Item 10), convenience receptacle (Figure 2, Item 7), entrance for load cables (Figure 2, Item 8), and fuel fill (Figure 2, Item 12).

Right-Side Body Panel (Figure 2, Item 3). The right-side body panel is located on the right-side of the generator set and contains the right-side access door (Figure 2, Item 5) and output box door (Figure 2, Item 6).

Storage Box (Figure 2, Item 4). An accessory box, stenciled Storage Box, has been installed on the inside of the right-side access door (Figure 2, Item 5) to provide space for the paralleling cable, grounding rod connecting hardware, and auxiliary fuel line.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS – CONTINUED

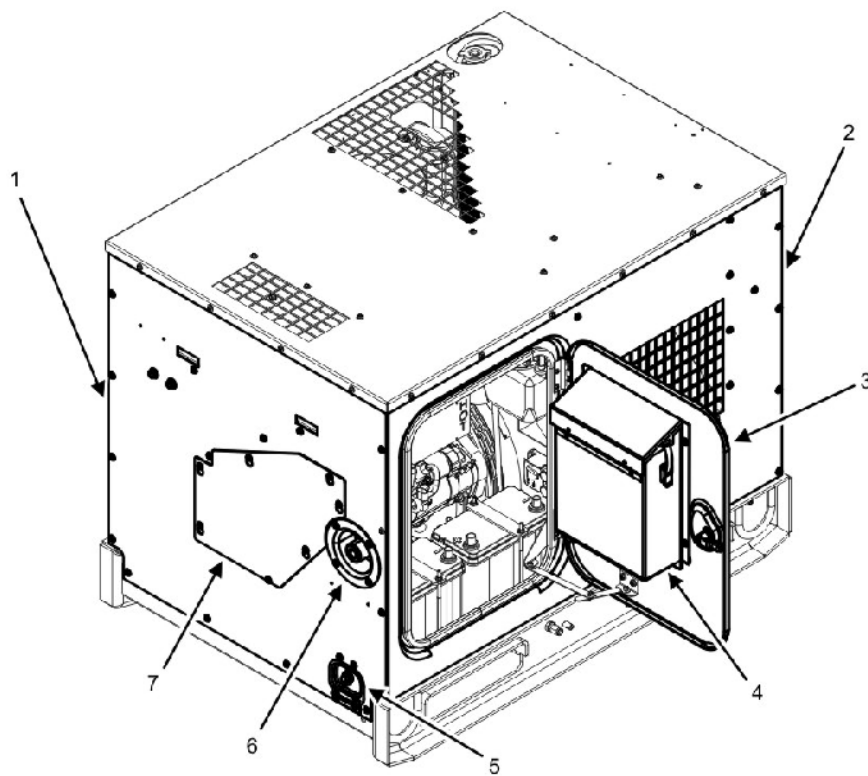


Figure 3. Front and Left-Side View with Door Open.

Front Body Panel (Figure 3, Item 1). The front body panel is located at the front of the generator set and contains the NATO slave receptacle (Figure 3, Item 6), the grounding rod storage access door (Figure 3, Item 5), and the access panel (Figure 3, Item 7).

Left-Side Body Panel (Figure 3, Item 2). The left-side body panel is located on the left-side of the generator set and contains the left-side access door (Figure 3, Item 3).

Document Box (Figure 3, Item 4). An accessory box, stenciled Document Box, has been installed on the rear of the left-side access door (Figure 3, Item 3) to provide space for the TM.

Identification (ID) Plates. Identification (ID) plates and placards for system safety and operation are attached to the housing. See TM 9-6115-749-10 for the placement and contents of the identification and safety placards.

DCS (Figure 2, Item 11)

The DCS is a microprocessor-based control that allows the operator and maintainer to: start/stop the generator set and regulate fuel source using the engine control switch; stop the generator set in emergencies with the EMERGENCY STOP switch; operate the contactor using the AC CIRCUIT INTERRUPT switch; adjust voltage, frequency, gain, panel lights, and other settings using the adjustment screens with the soft keys; clear/reset generator faults using the FAULT RESET control; operate in parallel with other generator sets using the UNIT PARALLEL switch; and perform other necessary functions to provide output power.

The control unit is powered by the generator set 24 VDC system. The controls are fully functional after approximately 4 seconds (sec) (boot-up time). Once the generator set model, frequency, and voltage configurations are determined by the DCS programming, the control automatically adjusts the display value limits, menus, and operational parameters accordingly, reducing potential operator error.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS – CONTINUED

The AMMPS 5 kW generator set provides limited remote operation capabilities through interface with an International Business Machine (IBM)-compatible Personal Computer (PC). The operational status of the generator set can be monitored, battleshort conditions can be set and released, and emergency stops can be executed from up to a 250-foot (ft) (76.2-meter (m)) distance. Loss of signal between the remote monitoring site and the generator set does not adversely affect the generator set operation.

The DCS display is a colored Liquid Crystal Display (LCD) with a 6.5-inch (in) (165.1 millimeters (mm)) diagonal viewing area. It provides a combination of switches and LCD soft keys to allow the operator and maintainer to control the generator set.

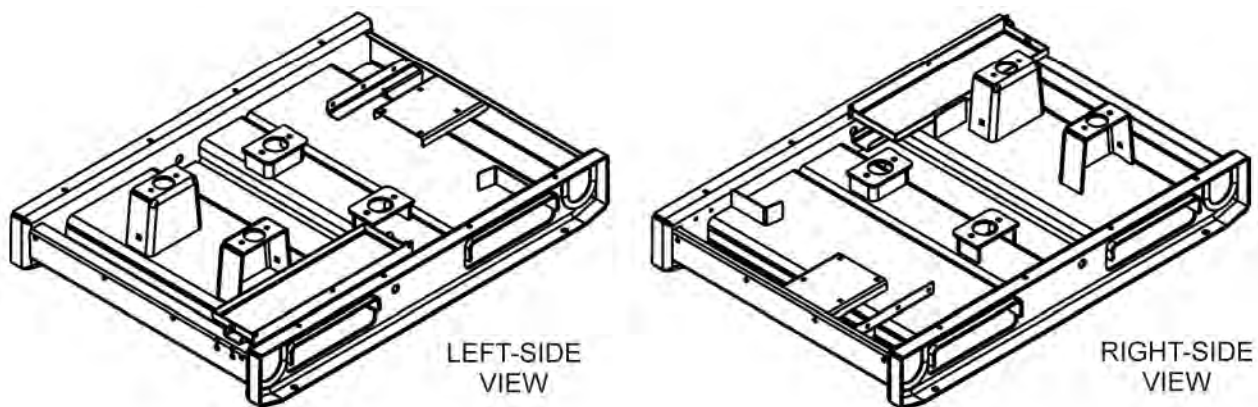
SKID ASSEMBLY (Figure 4)

Figure 4. Skid.

The housing sits on a steel skid that extends beyond the housing walls by approximately 0.39 in (10 mm). The engine and AC generator are directly mounted to the skid with the focus toward the roll inertia axis. This improves vibration isolation. The skid is equipped with forklift pockets for transportation capability. The skid base has drains located between the fork lift pockets on each side for draining liquids from the generator set.

ENGINE ASSEMBLY

The AMMPS 5 kW generator set uses a Kubota D902 diesel engine. The vertical, water-cooled, four-cycle Direct Injection (DI) diesel engine utilizes a three-cylinder, naturally-aspirated process. It consists of the cylinder head and valve cover, crankcase assembly, pistons, main bearing case, and lubrication system. It is mounted to the skid toward the front body panel of the generator set. See Figure 5 and Figure 6 for a breakdown of major engine components.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS – CONTINUED

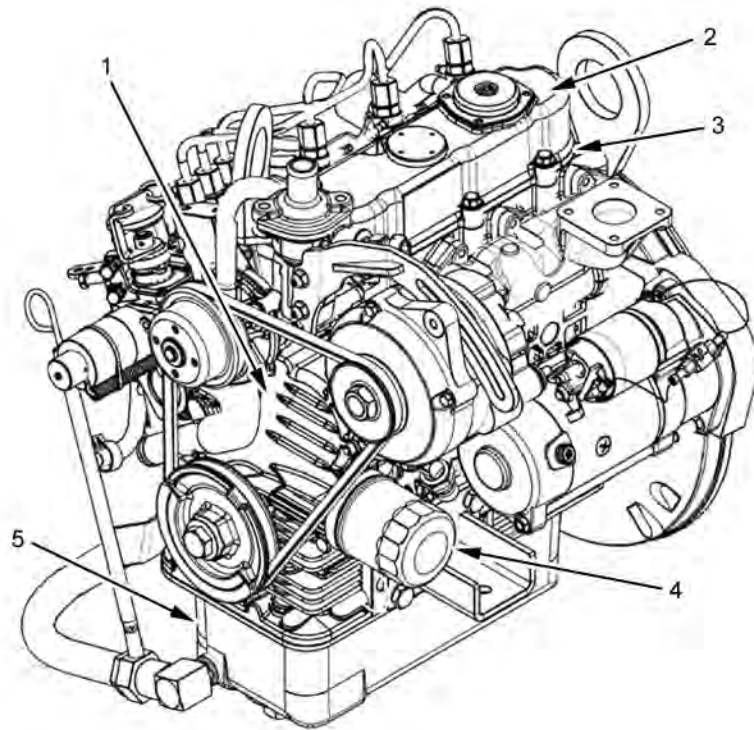


Figure 5. Engine Components - Left-Side.

Major Engine Components/Assemblies

Major engine components/assemblies include: cylinder head and valve cover assembly, block assembly, lubrication system, gear case assembly, flywheel assembly, engine fuel injection system, cooling system, DC electrical system, and air intake and exhaust system.

Cylinder Head (Figure 5, Item 3) and Valve Cover (Figure 5, Item 2) Assembly. The cylinder head, located on the top of the block assembly (Figure 6, Item 7), seals the upper ends of the cylinders to provide compression, protects the portion of the engine where combustion takes place, and houses the valve assembly. The valve cover is located on top of the cylinder head assembly and protects the valve assembly from contamination.

Block Assembly (Figure 6, Item 7). The block assembly houses the connecting rods, crankshaft, pistons, camshaft, and bearings.

Lubrication System. The AMMPS 5 kW generator set lubrication system is compatible with MIL-PRF-21260E preservative oil. The lubricating oil conforms to MIL-PRF-46167D NOTICE 1 and MIL-PRF-2104H.

Operators can safely check and add oil to the lubricating system while the generator set is operating or in the off condition. The lubrication system includes an oil-filler opening with captive cap (Figure 6, Item 5) to permit oil-filling from a standard 8-qt capacity can, and a readily-accessible oil-level bayonet gauge (dipstick) (Figure 6, Item 6). The dipstick (Figure 6, Item 6) is marked to ensure accurate reading of oil levels. See TM 9-6115-749-10 for more information.

Oil Filter (Figure 5, Item 4). The oil filter is located at the exhaust side front of the engine behind the battery-charging alternator belt. It removes impurities from the engine lubricating oil utilizing a full-flow, spin-on disposable oil filter cartridge.

Oil Drain Assembly (Figure 6, Item 9). The oil drain assembly is located between the oil pan (Figure 6, Item 8) (Figure 5, Item 5) and the unit skid. It allows the engine oil to be easily drained into a remote catch basin using a ball valve (Figure 6, Item 10).

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS – CONTINUED

Gear Case Assembly (Figure 5, Item 1). The gear case assembly is located on the front of the engine and protects the timing gears from contamination and damage.

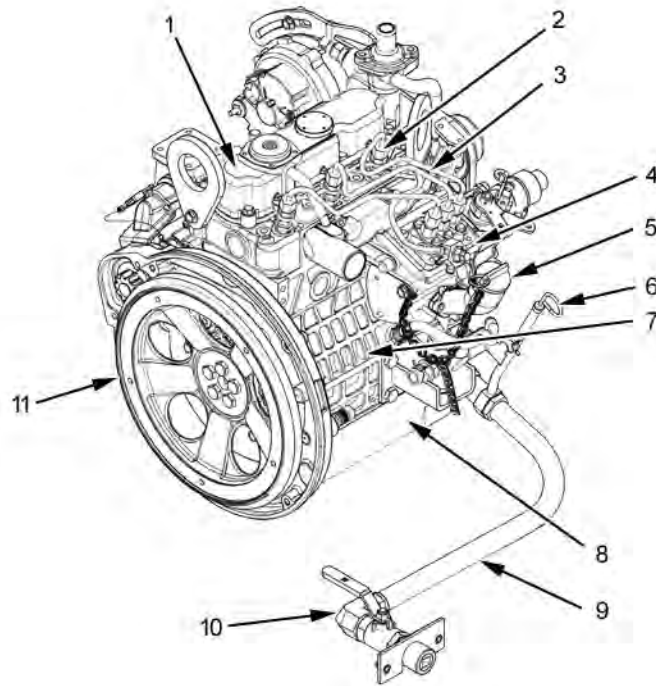


Figure 6. Engine Components - Right-Side.

Fuel Injection System. Once fuel has passed through the fuel filter/water separator (Figure 9, Item 6), the fuel passes through the engine fuel injection pump (Figure 6, Item 4). The engine fuel injection pump (Figure 6, Item 4) divides equal amounts of fuel for each of the engine's three cylinders. The fuel then passes through the three injector lines (Figure 6, Item 3) to the three fuel injectors (Figure 6, Item 2) (one in each cylinder) located on the right-side of the valve cover (Figure 6, Item 1). The three fuel injectors (Figure 6, Item 2) spray the fuel at high pressure into the cylinder where it is burned.

Flywheel Assembly (Figure 6, Item 11). The flywheel assembly connects the engine to the AC generator to transmit rotational mechanical energy for the generation of electricity.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS – CONTINUED

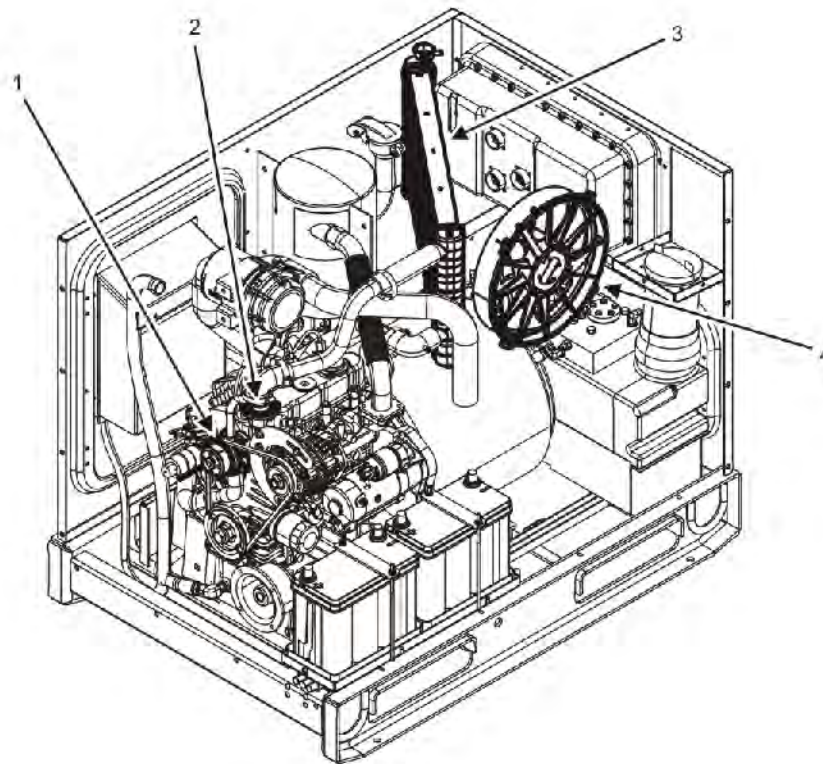


Figure 7. Cooling System Components - Left-Side.

Unit Cooling System

Cooling Fan (Figure 7, Item 4). The cooling fan allows the generator set to operate in all required operational environments. The 16 in (41 cm), variable-speed, 24 VDC cooling fan optimizes radiator location and airflow paths for improved cooling efficiency. Intake air for the cooling system is drawn by the cooling fan through a grille on the left-side body panel. This air passes through the cooling fins of the radiator (Figure 7, Item 3), transferring heat from the cooling system to the airflow. The warm air is then expelled into the atmosphere through a grille in the top body panel. The cooling system also reduces wear on the battery-charging alternator belt and water pump. Cold weather operation is also improved by regulating cabinet temperature at or near ideal operating temperatures.

Coolant Circulation System. This system consists of the radiator (Figure 7, Item 3), thermostat (Figure 7, Item 2), water pump (Figure 7, Item 1), and coolant overflow bottle (Figure 8). It is responsible for keeping the engine at a safe temperature. See TM 9-6115-749-10 for further information on maintaining the cooling system.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS – CONTINUED

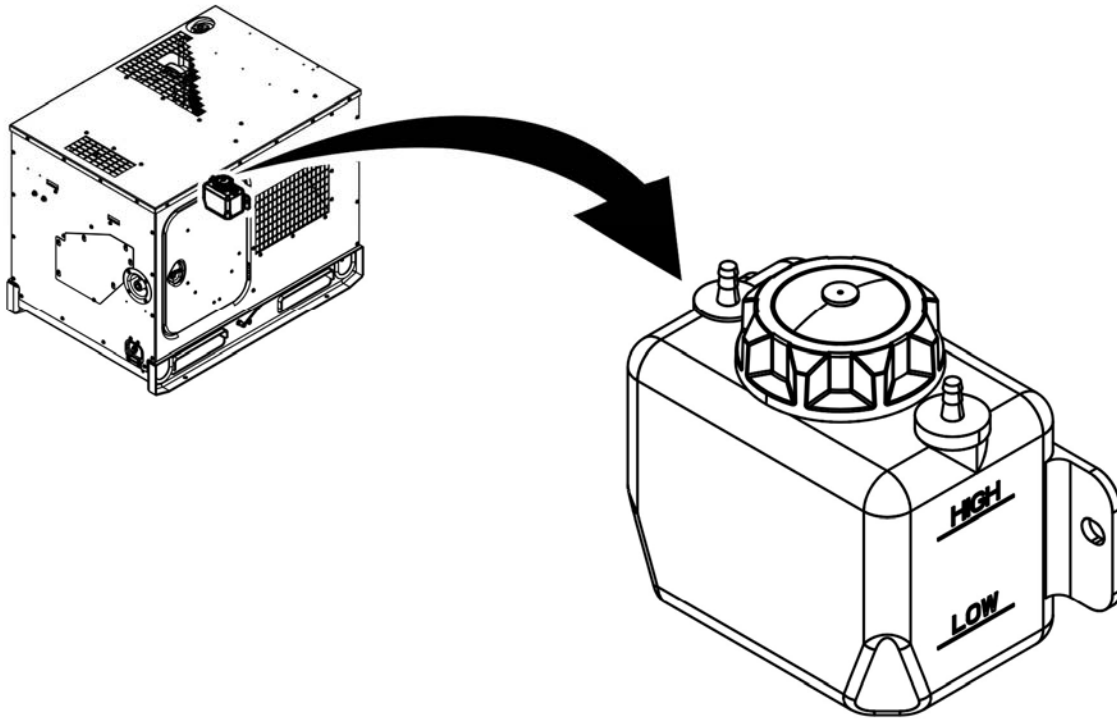


Figure 8. Coolant Overflow Bottle - Location.

Coolant Overflow Bottle (Figure 8). Mounted inside the left-side door on the bulkhead, the coolant overflow bottle is clearly visible with the door open. It provides easy access for examination of coolant level and coolant filling.

Radiator (Figure 7, Item 3). An aluminum radiator acts as a heat exchanger for the coolant. A radiator fill port is accessible on the top body panel. The captive radiator cap prevents loss of coolant.

Thermostat (Figure 7, Item 2). A thermostat is located inside the housing where the upper radiator hose connects to the top of the engine. It monitors coolant temperature and adjusts the cooling system accordingly.

Water Pump (Figure 7, Item 1). The water pump circulates the coolant through the block assembly (Figure 6, Item 7) and the radiator (Figure 7, Item 3).

Winterization Kit (Figure 10, Item 6). The optional winterization kit is located inside of the right-side body panel. The fuel-fired heater warms coolant in extreme cold conditions (-25 to -50 °F (-31.67 to -46 °C)) by utilizing the fuel from the generator set. The winterization kit automatically activates, depending on the temperature, and features automatic heat regulation. It is controlled by the DCS, which provides the [READY TO CRANK] indicator when the heater has completed its cycle.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS – CONTINUED

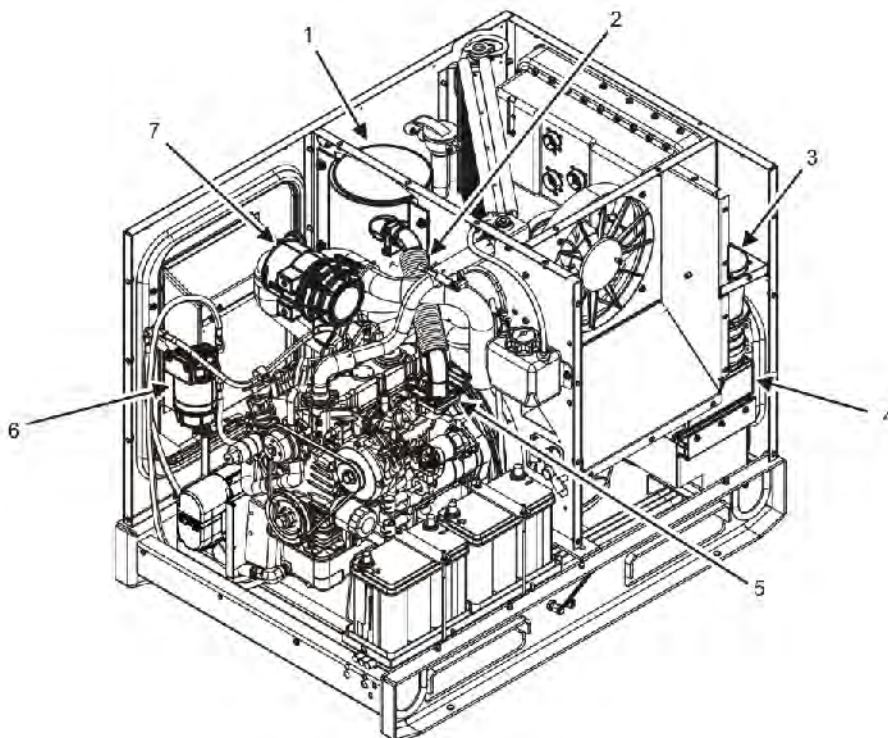


Figure 9. Systems Components - Left-Side.

Air Cleaner Assembly (Figure 9, Item 7)

The air cleaner assembly, mounted on the top body panel, filters contaminants from the intake air. The air cleaner assembly contains an integrated, centrifugal precleaner that removes most dust particles prior to entering the air cleaner element. These larger contaminants are easily ejected from the air cleaner assembly through a squeeze-type fitting. This extends filter life and reduces maintenance costs and downtime. The air cleaner assembly is fitted with an indicator to show when the filter capacity is exceeded. The filter element is replaceable (TM 9-6115-749-10).

Exhaust System

The exhaust manifold (Figure 9, Item 5) is located on the exhaust side of the engine and is accessible through the left-side access door. As exhaust leaves the compression chamber, it is routed through the exhaust manifold (Figure 9, Item 5) into a single pipe (Figure 9, Item 2), and then into the muffler (Figure 9, Item 1) that is accessible through the right-side access door. The muffler (Figure 9, Item 1) silences the exhaust pulses from the engine and expels exhaust gases through the top body panel grille.

Unit Fuel System

Fuel Fill (Figure 9, Item 3) and Fuel Tank (Figure 9, Item 4). The AMMPS 5 kW generator set is designed to utilize diesel fuel or an acceptable substitute (Grade No. 1-D and Grade No. 2-D fuels per A-A-52557) and includes design adaptations to accommodate the usage of Jet Propulsion (JP)-8. The fuel fill is located on the rear body panel and allows refueling during operation (TM 9-6115-749-10). The fuel tank is mounted directly to the skid assembly behind the front access door. It is designed for 8 h of operation at 75 percent (%) load on JP-8 fuel with the generator set at a 15° angle. The tank drain extends down into the skid area between the lifting attachments. The main fuel pump transmits lower-pressure fuel from the fuel tank and sends it through an in-line fuel filter to the fuel filter/water separator (Figure 9, Item 6).

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS – CONTINUED

Fuel Filter/Water Separator (Figure 9, Item 6). The fuel filter/water separator element is spin-on and removes debris and water particles from fuel before it enters the engine. A water drain cock is on the bottom of the filter (TM 9-6115-749-10).

External Fuel Tank and Auxiliary Connections. External fuel tank and auxiliary connections are located at the rear of the fuel fill (Figure 9, Item 3). The auxiliary fuel pump transfers fuel from the auxiliary fuel tank to the unit fuel tank.

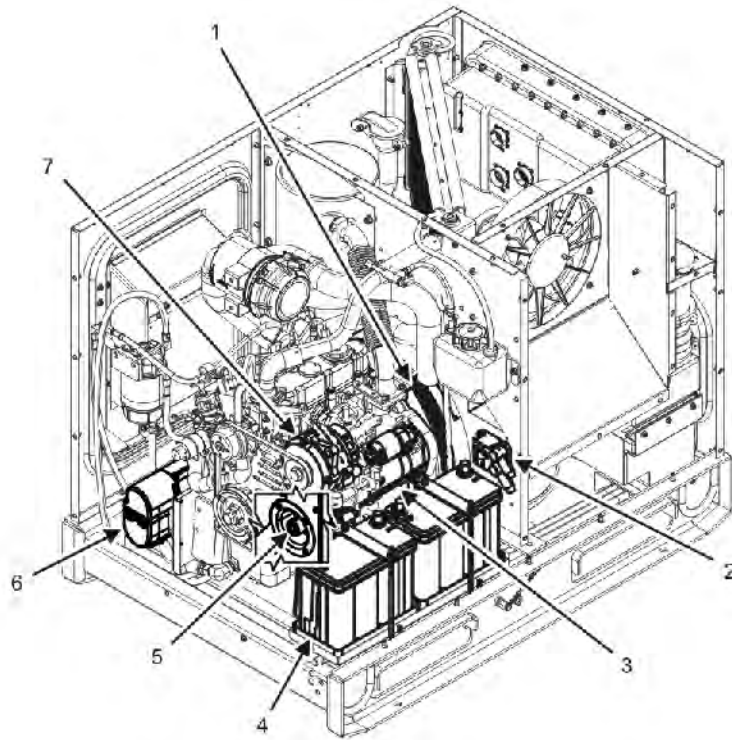


Figure 10. Winterization Kit, 24 VDC Electrical and AC Generator Components - Left-Side.

24 VDC Electrical System

The 24 VDC electrical system uses two 12-volt (V) batteries (Figure 10, Item 4) connected in series. The batteries (Figure 10, Item 4) are standard commercial size, maintenance free, sealed, and located side-by-side on the left-side of the unit. They are accessed through the left-side door. The batteries (Figure 10, Item 4) are capable of starting the generator set under all conditions between -50 and 135 °F (-46 and 57 °C) ambient temperatures. The starter (Figure 10, Item 3) is located on the exhaust side of the engine above the oil pan. A NATO slave receptacle (Figure 10, Item 5) is provided should the unit require jump-starting from another 24 VDC source. In the event the engine needs to be turned without starting, a three-position DEAD CRANK SWITCH (Figure 11, Item 2) is included. The 24 VDC system is protected by a 50 Amperes (A) main DC circuit breaker (Figure 10, Item 2). The main DC circuit breaker (Figure 10, Item 2) is accessed through the left-side door.

If the temperature is between 21 and -25 °F (-6 and -32 °C), glow plugs (Figure 11, Item 1) located in the intake manifold may be used to aid in starting. For temperatures between -25 and -50 °F (-32 and -46 °C), the optional winterization kit (Figure 10, Item 6) is to be used as an engine starting aid (TM 9-6115-749-10).

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS – CONTINUED

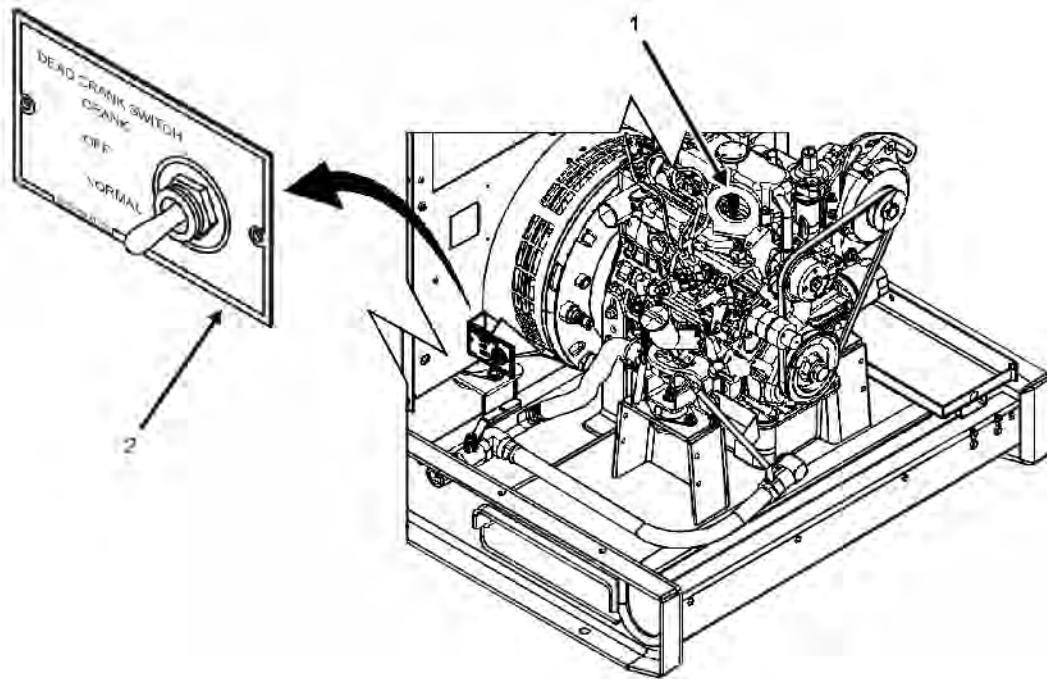


Figure 11. DEAD CRANK SWITCH - Right-Side.

Belt-Driven, Battery-Charging Alternator (Figure 10, Item 7). The standard belt-driven, battery-charging alternator recharges the batteries which in turn provide power to the cooling fan, DCS, and engine systems. The charging system completely charges the batteries during operation within 4 h of startup. A voltage regulator (internal to the alternator) controls the voltage output of the belt-driven, battery-charging alternator.

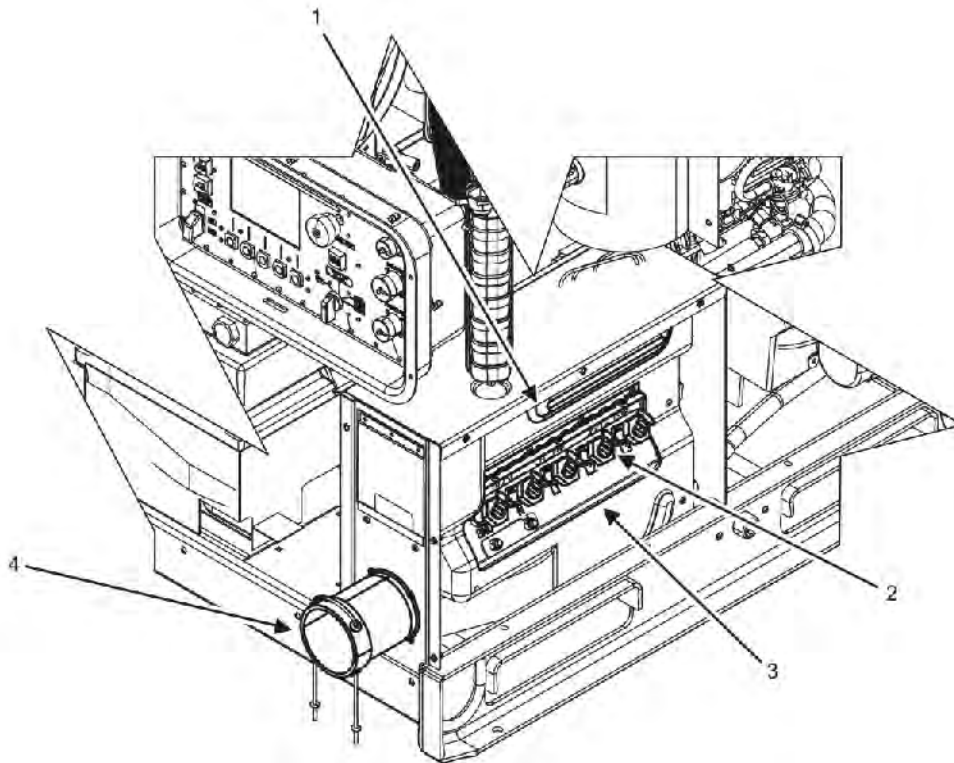
LOCATION AND DESCRIPTION OF MAJOR COMPONENTS – CONTINUED

Figure 12. Output Box Components - Right-Side.

AC GENERATOR (Figure 10, Item 1)

The AC generator converts the rotating mechanical energy from the engine into electrical energy. The electrical energy is then distributed from the output box (Figure 12, Item 1) through cables which enter the output box (Figure 12, Item 1) via a flexible sleeve (Figure 12, Item 4) from field equipment requiring electric power or a switch box.

The AC generator and voltage control system are drip-proof, guarded machine type, and are synchronous and brushless, as specified in National Electrical Manufacturers Association (NEMA) Standard No. MG, part 33. The bearings are sealed and permanently lubricated. System leads are identified with permanent marker and are brought out of the frame through non-abrasive bushings and holders in the output terminal board (Figure 12, Item 3). These isolate each lead and hold it securely in place.

When operating in three-phase at rated load and frequency, the AC generator can withstand, without damage, two consecutive short circuits at the load terminals of 10 sec or less in duration within a 5-min interval at less than 300% of rated output current. Given the same parameters in single-phase operation, the short circuits can be withstood for 5-sec durations.

OUTPUT BOX ASSEMBLY (Figure 12, Item 1)

The output box assembly is located behind the right-side output box door (Figure 2, Item 6) and distributes electricity produced by the AC generator (Figure 10, Item 1) through the output terminal board (Figure 12, Item 3). The output box (Figure 12, Item 1) contains the output terminal board (Figure 12, Item 3), individual output load terminals (Figure 12, Item 2), and unit relays. All relays are socket mounted and secured with a cover. The relay will not move unless the cover is removed.

DIFFERENCES BETWEEN MODELS

The differences between models of generator set covered in this manual are as follows:

Model 04-1030 is equipped with a 50/60 Hz generator.

Model 04-1031 is equipped with a 400 Hz generator.

EQUIPMENT DATA

For a list of leading particulars, refer to Table 1.

Table 1. Equipment Data.

GENERATOR SET:		
Model Numbers:		
5 kW 50/60 Hz		04-1030
5 kW 400 Hz		04-1031
National Stock Numbers (NSN):		
5 kW 50/60 Hz		NSN 6115-01-561-7329
5 kW 400 Hz		NSN 6115-01-561-7438
Overall Length:		
04-1030		45 in (114.30 cm)
04-1031		45 in (114.30 cm)
Overall Width:		
04-1030		32 in (81.28 cm)
04-1031		32 in (81.28 cm)
Overall Height:		
04-1030		36 in (91.44 cm)
04-1031		36 in (91.44 cm)
Dry Weights (engine oil full, winterization kit removed, and no fuel):		
04-1030		780 lb (353.80 kg)
04-1031		775 lb (351.53 kg)
Dry Weights (engine oil full, winterization kit installed, and no fuel):		
04-1030		790 lb (358.34 kg)
04-1031		785 lb (356.07 kg)
Wet Weights (engine oil full, winterization kit removed, and 8 hr fuel):		
04-1030		800 lb (362.87 kg)
04-1031		795 lb (360.61 kg)

EQUIPMENT DATA – CONTINUED

Table 1. Equipment Data. – Continued

GENERATOR SET:	
Wet Weights (engine oil full, winterization kit installed, and 8 hr fuel):	
04-1030	810 lb (367.411 kg)
04-1031	800 lb (362.87 kg)
Engine:	
Manufacturer	Kubota
Model	D902-IV C
Type:	Direct injection, three cylinder, four cycle, vertical, water cooled
Displacement	59 in ³ (0.9 L)
Altitude Degradation, 4,000-8,000 ft (1,220-2,440 m)	3.5% per 1,000 ft (305 m)
Firing Order	1 - 2 - 3
Winterization Kit Use	-25 to -50 °F (-32 to -46 °C)
Valve Tappet Clearance Adjustment	0.00571-0.00728 in (0.145-0.185 mm)
Cooling System:	
Type	Pressurized radiator, forced circulation with pump
Capacity	5.3 qt (5.02 L)
Normal Operating Temperature Range	185 to 223 °F (85 to 106 °C)
Temperature Indicating System Voltage Rating	24 VDC
Lubrication System:	
Type	Forced lubrication by trochoid pump
Oil Pump Type	Gear driven
Normal Operating Pressure	28-64 psi (196-441 kPa)
Oil Filter Type	Spin-on, cartridge
Lubricating System Capacity	3.9 qt (3.7 L)
Pressure Indicating System Voltage Rating	5 VDC
Fuel System:	
Type of Fuel	DF-2D (ASTM D975)
Fuel Tank Capacity	3.80 gal (14.38 L)
Fuel Consumption Rates for	
50/60 Hz (04-1030):	0.39 gal/h (1.476 L/h)
400 Hz (04-1031):	0.43 gal/h (1.59 L/h)
Auxiliary Fuel Pump:	
Voltage Rating	24 VDC
Delivery Pressure	6.3-9.7 psi (43.4-66.9 kPa)

EQUIPMENT DATA – CONTINUED

Table 1. Equipment Data. – Continued

GENERATOR SET:	
Fuel Level Sensor:	
Type	Capacitive
Current	20-200 mA at 10-32 VDC
Starting System:	
Batteries	2x12 VDC (52 Ah) in series
Starter:	
Manufacturer	ISKRA
Model	AZE4836
Voltage Rating	24 VDC
Drive Type	Integral
Battery-Charging Alternator:	
Manufacturer	ISKRA
Models	DRWNG 19020205
Rating	45 A
Protective Fuse	None
AC Generator:	
Manufacturer	Cummins
Type	YD-6050-5 (50/60 Hz) and YD-400-5 (400 Hz)
Load Capacity	5 kW
Current Ratings:	
120 V 1-Phase connection	52 A
120/240 V 1-Phase connection	26 A
120/208 V 3-Phase connection	17 A
Power Factor	0.8
Cooling	Fan cooled
Drive Type	Direct coupling
Duty Classification	Continuous
Protection Devices:	
Low Oil Pressure Controller:	
Trip Pressure	10 psi (145 kPa)
Voltage Rating	5 VDC
Current Rating	4-5 mA
Coolant High Temperature Controller:	
Trip Temperature, Mode I, 50/60 HZ	230 °F (110 °C)
Trip Temperature, Mode II, 400 HZ	230 °F (110 °C)
Voltage Rating	24 VDC

EQUIPMENT DATA – CONTINUED**Table 1. Equipment Data. – Continued**

GENERATOR SET:	
Current Rating	1 mA
Overvoltage:	
Trip Point Conditions	Not more than 30% of rated voltage.
Trip Point	No more than 1.25 sec after trip condition exists.

END OF WORK PACKAGE

THEORY OF OPERATION

SCOPE

The AMMPS 5 kW generator set consists of two modes as follows:

MODES: I - 50/60 Hz
 II - 400 Hz

The AMMPS 5 kW generator set is specifically designed for the best possible performance focusing on areas such as reliability, maintainability, weight, dimensions, and fuel consumption.

OPERATION

The AMMPS 5 kW generator set is designed for deployment in the battlefield to provide personnel with continuous power generation necessary for today's fielded electronic devices and various electrical equipment demands. The AMMPS 5 kW generator set is developed to be fixed (skid mounted) or mobile (trailer mounted) giving the flexibility of movement. The generator sets are designed to accommodate parallel operation of generator sets as well as additional and back-up power generation.

The housing assembly serves as the protective shell for the generator set. The housing has been designed with openings for ease of maintenance and additional acoustical protection to further silence the generator set while operating. The AMMPS 5 kW generator has enhancements for protection from unusual/harsh weather and to shield it from debris.

The generator set is powered by a naturally-aspirated Kubota 59-in³ (0.9-L) DI D902 diesel engine mounted directly to the skid assembly. The engine produces mechanical energy and interconnects with the AC generator via a rotating shaft.

The AC generator is a Cummins Power Generation (CPG) YD-6050-5 (Mode I, Model 1030 (50/60 Hz)) or a YD-400-5 (Mode II, Model 1031 (400 Hz)). It is a synchronous, brushless design and was developed specifically to meet performance requirements. The AC generators receive mechanical energy from the engine and convert it to electrical energy. The electricity produced by the AC generators is transmitted to the output terminal board.

DCS

The DCS uses a menu-driven display format to control generator set operations. From the DCS, the operator and/or maintainer can start the generator set, adjust the output voltage and frequency (Model 1030, Mode I only), operate the contactor, stop the AC generator, clear faults, and perform other functions necessary to produce power (Figure 1). The AMMPS 5 kW generator set also provides limited remote operation capabilities through interface with an IBM-compatible PC. The operational status of the generator set can be monitored, battleshort conditions can be set and released, and emergency stops can be executed from up to a 250 ft (76.2 m) distance.

The AMMPS 5 kW generator set is capable of self-diagnostics at start up. This prognostics function monitors the protective system and will provide a warning of impending activation of protective devices. All operational data is captured every 15 min during operation. Faults and warnings are automatically captured upon operation of protective devices and stored in a Fault Log. Additionally, all maintenance prompts and actions are automatically captured and stored in a Maintenance Log.

DCS – CONTINUED

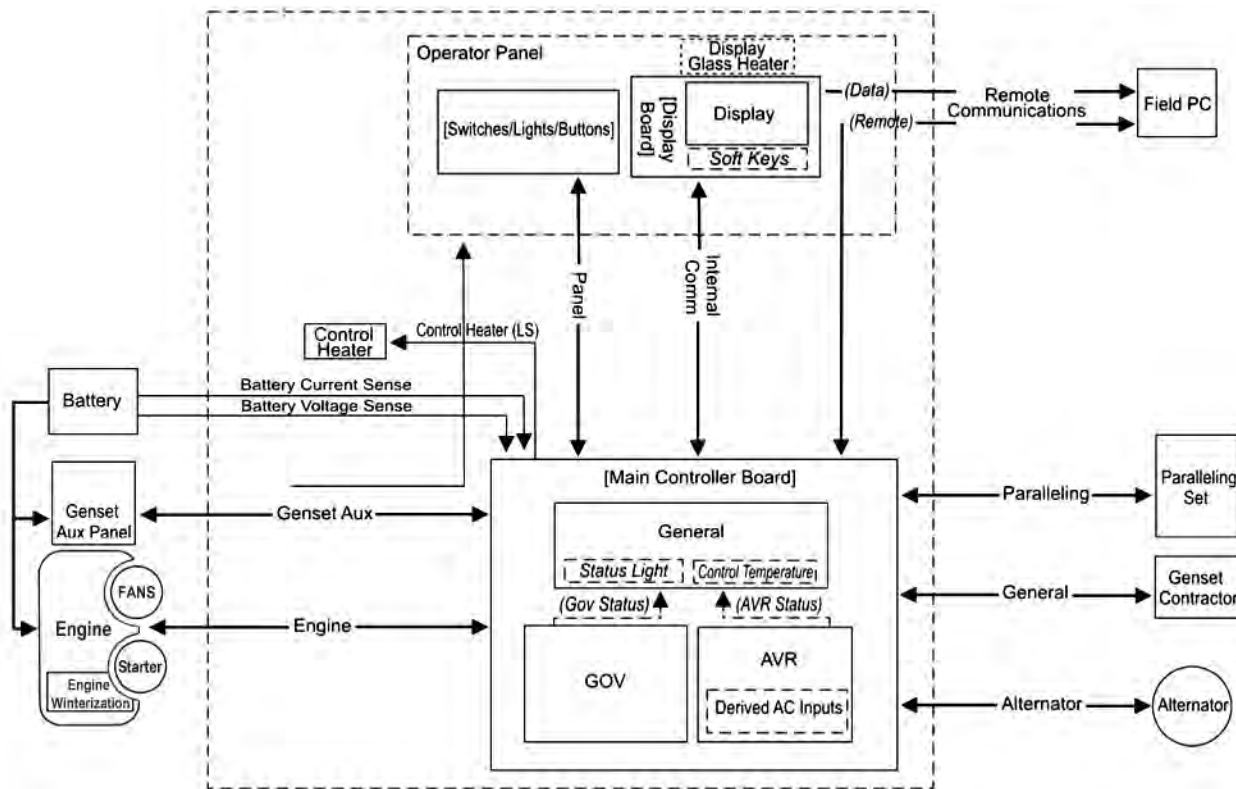


Figure 1. AMMPS Control Overview.

TECHNICAL PRINCIPLES OF OPERATION

Engine Starting System (Figure 2)

The engine starting system consists of two 12 VDC batteries connected in series to produce 24 VDC of electric power, a starter, a 24 VDC battery-charging alternator, a magnetic pickup (for sensing engine speed), and related switches and relays required for controlling the starting system (Figure 1). For engine cranking, battery power is supplied to the starter motor through the starter solenoid, which in turn is controlled by the cranking relay. The starter then engages the engine flywheel, causing the engine to turn over. For engine starting, the DEAD CRANK SWITCH must be in the NORMAL position, the main DC circuit breaker must be in the ON position, the EMERGENCY STOP switch must be pulled out, and the engine control switch must be moved to the START position. The cranking relay is then controlled by a circuit, consisting of the crank disconnect relay and crank disconnect switch. As the engine accelerates to the preset speed (sensed by the magnetic pickup), the crank disconnect switch opens and de-energizes the cranking relay to stop and disengage the starter. The starting sequence may also be stopped by moving the engine control switch to OFF. The engine may be cranked without starting by use of the DEAD CRANK SWITCH. With the DEAD CRANK SWITCH in the CRANK position, the cranking relay, starter solenoid, and starter motor are energized without activating any other starting or control functions. In the event the batteries become discharged, an alternative source of starting power is provided through the NATO slave receptacle.

The batteries are charged by the battery-charging alternator, which is belt-driven by the engine. The DCS is powered by the battery-charging alternator when the engine is operating and by the 24 VDC batteries at start up. Shown on the DCS display, the [Battery] ammeter indicates the charge/discharge rate of the batteries (from -80 A to +80 A, in 0.1 A increments). Normal operating indication depends on the state of charge in the batteries. A low charge, such as exists immediately after engine starting, will cause a high reading (needle moves toward [+] area). When the charge in the batteries has been restored, the indicator moves toward zero.

TECHNICAL PRINCIPLES OF OPERATION – CONTINUED

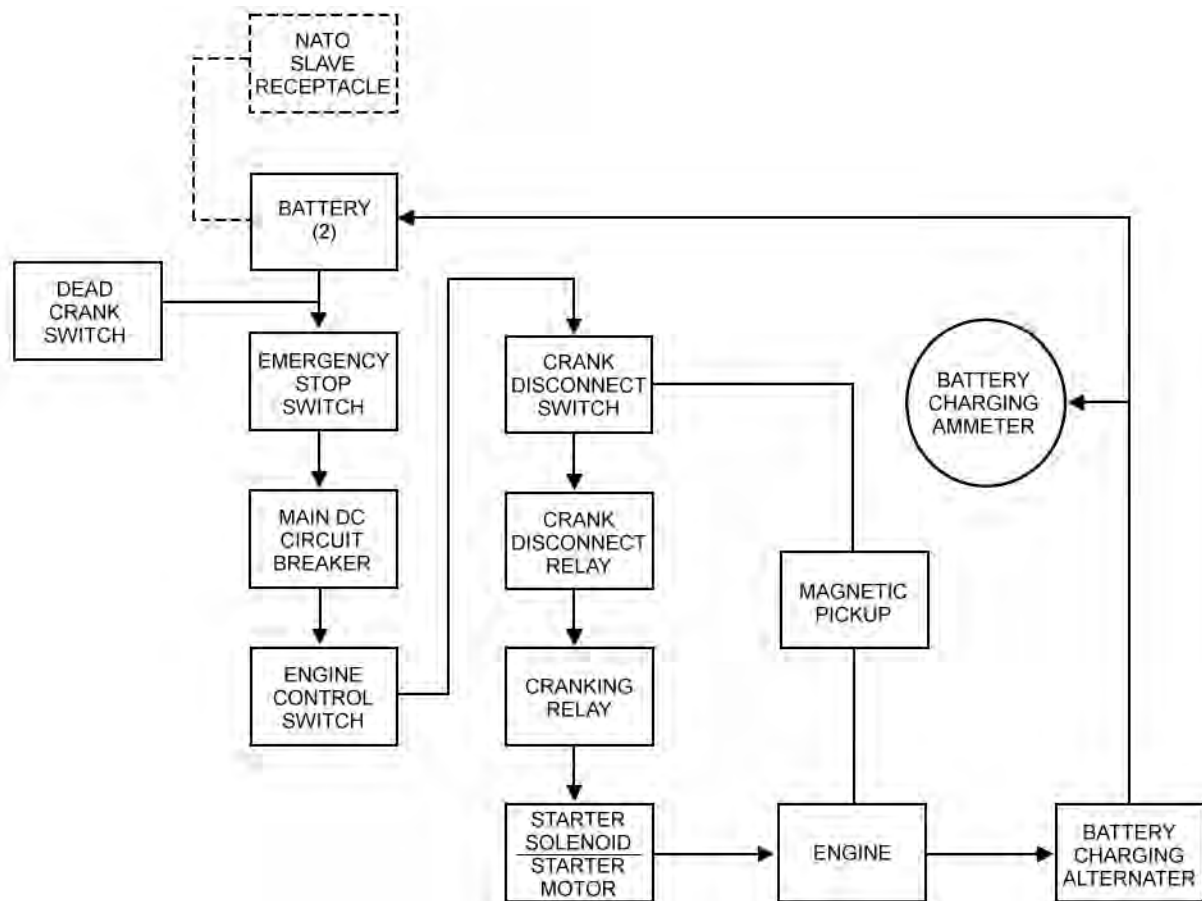


Figure 2. Engine Starting System.

Fuel System (Figure 3)

The fuel system consists of piping, fuel tank, fuel filter, 24 VDC fuel pumps, fuel filter/water separator, fuel level sensor, injection pump, and three fuel injectors (one for each cylinder). Fuel is drawn from the fuel tank by the transfer pump when the engine control switch is in the PRIME & RUN position. After reaching the transfer pump, fuel passes through a fuel filter/water separator where water and small impurities are removed. The fuel then goes to the injection pumps where it is pressurized and is forced into the injectors. Through the injectors, fuel is sprayed into the combustion chamber at high pressure, where it is mixed with air and ignited. The fuel that is not used is returned to the fuel tank via a fuel vent line.

The auxiliary fuel system consists of an external fuel supply, fuel filter pipe, 5 VDC auxiliary fuel pump, and fuel level switch. The engine control switch, when set to PRIME & RUN AUX FUEL, actuates the auxiliary fuel pump and transfers fuel from the external fuel supply to the generator fuel tank. The fuel level switch shuts off the auxiliary fuel pump when the generator fuel tank is full and reactivates the pump as the level drops to 75%. The [Fuel] indicator on the DCS displays the fuel level of the generator set fuel tank from empty [0] to full [100] in 1% increments.

TECHNICAL PRINCIPLES OF OPERATION – CONTINUED

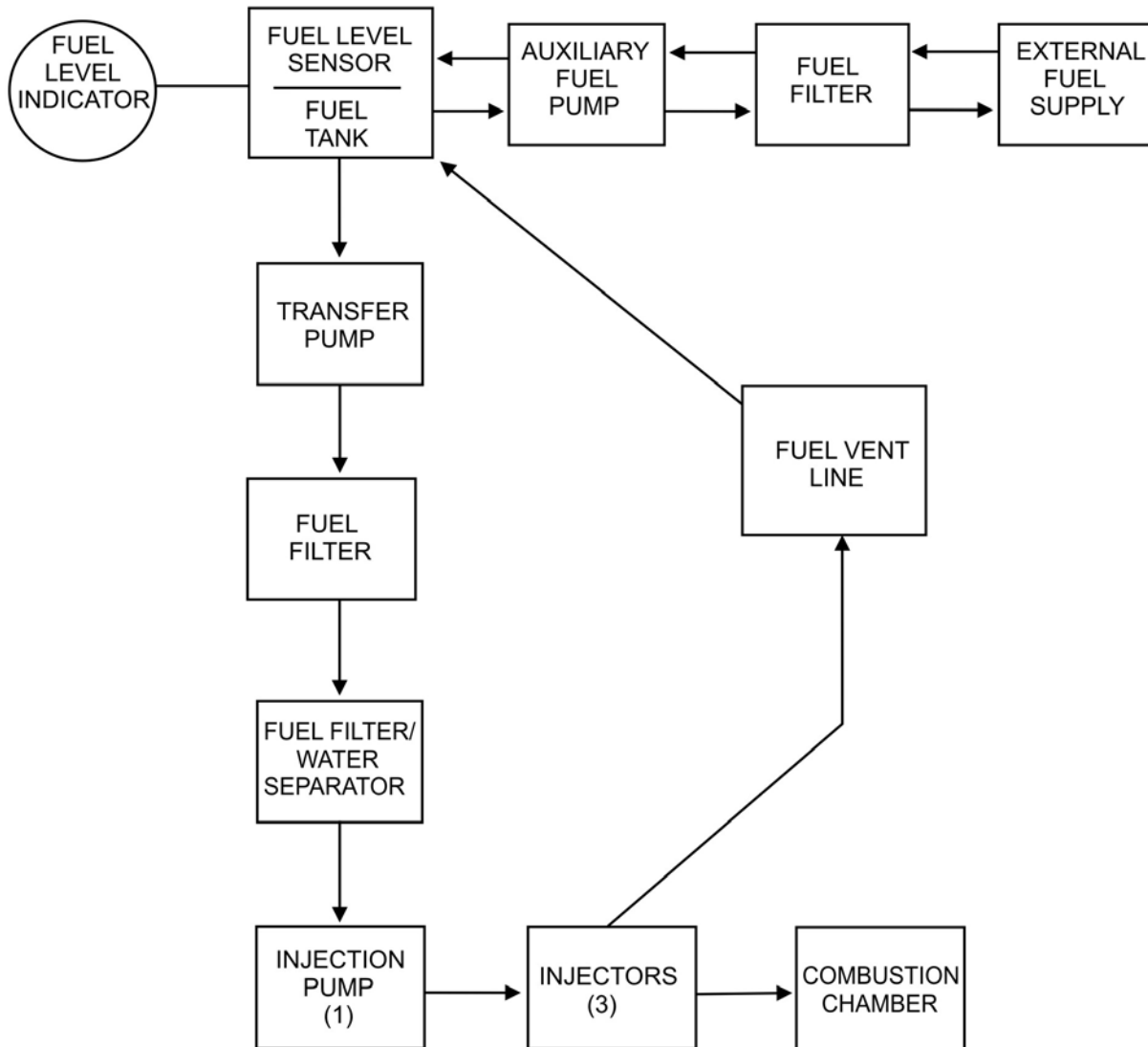


Figure 3. Fuel System.

Engine Cooling System (Figure 4)

The engine cooling system consists of a radiator, hoses, thermostat, water pump, electric fan, temperature sensor, and cooling jackets. The water pump forces coolant through passages (cooling jackets) in the engine block and cylinder head where the coolant absorbs heat from the engine. When the engine reaches normal operating temperature, the thermostat opens and the heated coolant flows through the upper radiator hose assembly into the radiator. Air circulates through the radiator, reducing coolant temperature.

A coolant high-temperature logic control provides automatic shutdown in the event that coolant temperature exceeds 225 plus or minus ($\pm$) 5 °F (107 ± 3 °C). The [Coolant] indicator on the DCS displays coolant temperature range from 100 to 260 °F (38 to 127 °C).

Cold outside temperatures make starting the engine difficult. To improve engine starting, the generator set has two starting aids: standard glow plugs and an optional winterization kit. The glow plugs warm the air in the combustion chamber to assist with ignition when the ambient air temperature is below 20 °F (-6 °C). The winterization kit warms the engine coolant and thus the engine block when the ambient air temperature is between -25 and -50 °F (-32 and -46 °C).

TECHNICAL PRINCIPLES OF OPERATION – CONTINUED

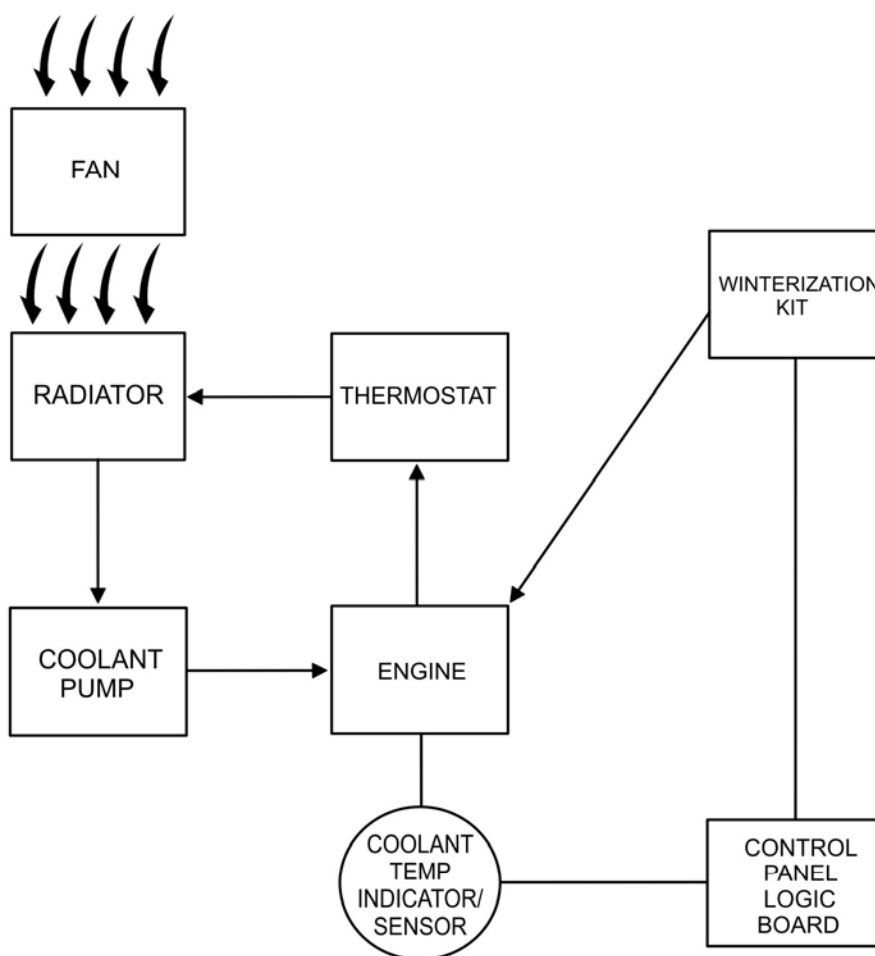


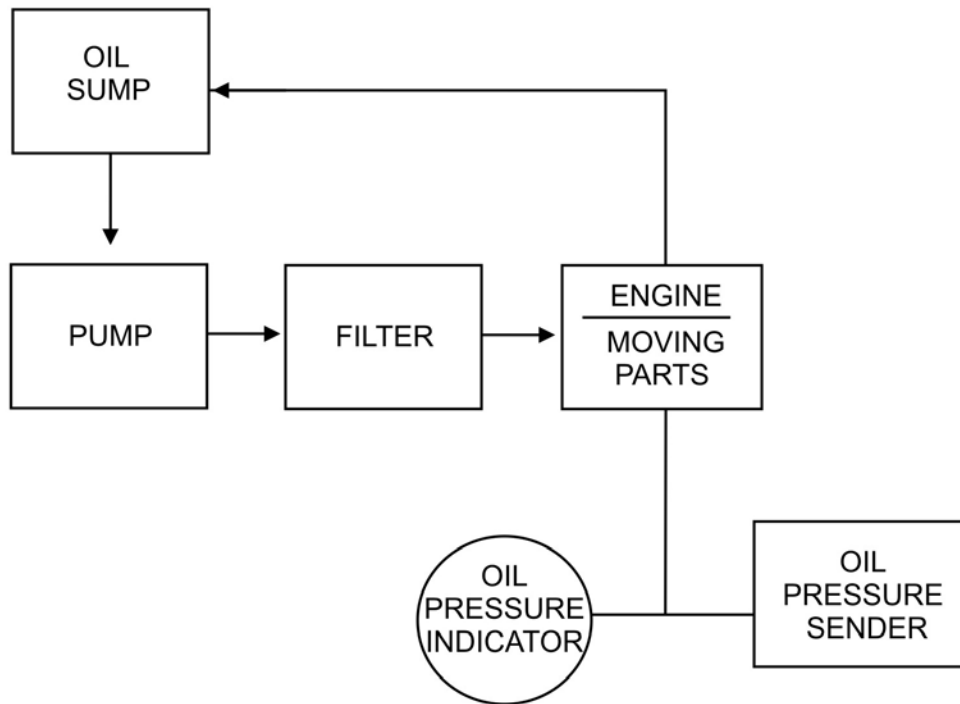
Figure 4. Engine Cooling System.

Lubrication System (Figure 5)

The lubrication system consists of an oil pan, dipstick, oil pump, oil pressure sensor, oil screen, and oil filter. The oil pan is a reservoir for engine lubricating oil. The dipstick indicates oil level in the pan. A pump draws oil from the pan through a screen removing large impurities. The oil then passes through a spin-on type filter where small impurities are removed. From the filter, oil enters the engine and is distributed to the engine's internal moving parts.

After passing through the engine, the oil returns to the oil pan. The [Oil] pressure indicator on the DCS shows oil pressure sensed by the oil pressure sensor in the engine. The engine automatically shuts off if oil pressure drops to a dangerously low level. It is recommended to check the engine oil when the engine is not operating, but it can be checked while the engine is operating (TM 9-6115-749-10).

TECHNICAL PRINCIPLES OF OPERATION – CONTINUED

**Figure 5. Engine Lubrication System.****Air Intake and Exhaust System (Figure 6)**

The air intake and exhaust system consists of an air cleaner assembly, intake manifold, exhaust manifold, and muffler. Ambient air is drawn into the air cleaner assembly where it passes through the air cleaner element.

Airborne dirt is removed and trapped in the element. A restriction indicator, located on the air cleaner assembly housing, displays red when the air cleaner element should be serviced. Filtered air is drawn out of the air cleaner assembly through an air intake tube into the air intake manifold, where it passes into the engine and is mixed with fuel from the fuel injectors.

The engine exhaust gases are expelled into the exhaust manifold. The exhaust manifold channels the gases into the muffler to deaden the sound of the exhaust gases. The gases pass from the muffler outlet and are vented upward from the generator set housing grille.

TECHNICAL PRINCIPLES OF OPERATION – CONTINUED

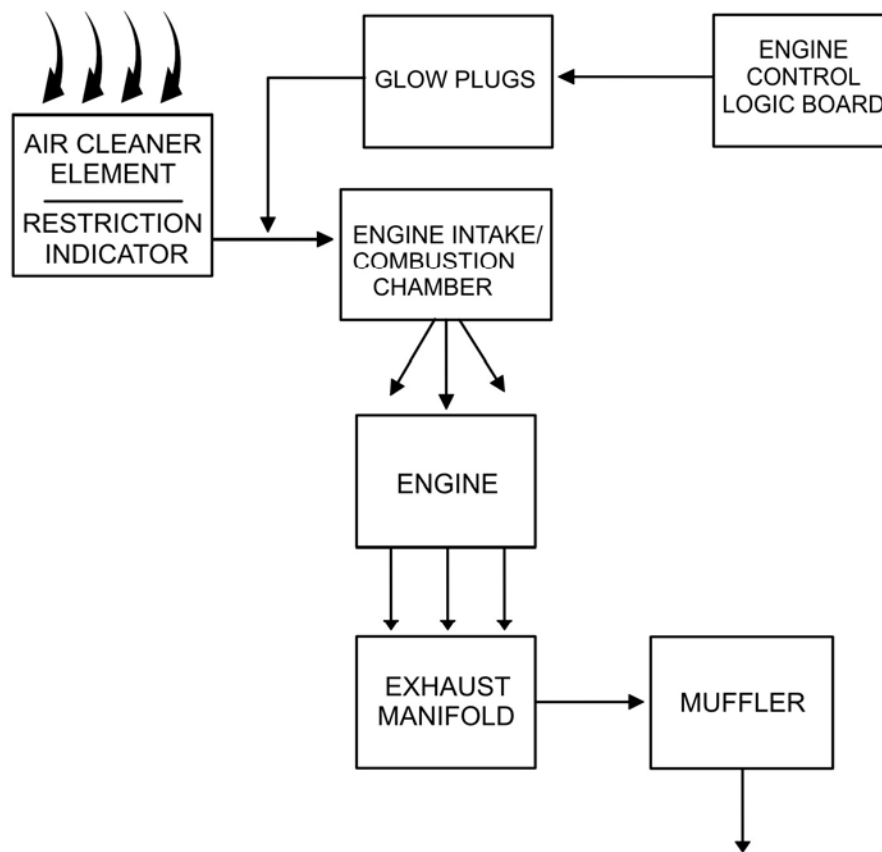


Figure 6. Air Intake and Exhaust System.

Output Supply System (Figure 7)

The output supply system consists of the AC generator, output terminal board, voltage selection switch, Automatic Voltage Regulator (AVR), Ampere Meter-Voltage Meter (AM-VM), AC circuit interrupt relay, and contactor. Power created by the generator is supplied through the voltage selection switch and the contactor to the output terminals on the output terminal board. For more information on the theory and practice of electrical generation, refer to FM 5-424, Theater of Operations Electrical Systems.

The voltage selection switch allows configuration of the generator set for the following voltage ranges:

120 V, 1-phase, 2-wire

120/240 V, 1-phase, 3-wire

120/208 V, 3-phase, 4-wire

The AC CIRCUIT INTERRUPT switch controls the AC circuit interrupter relay. The relay enables or interrupts the power flow between the voltage selection switch and the output terminals by opening and closing the contactor. The AC circuit interrupter relay also automatically opens the contactor during any of the faults that require a shut-down. The AVR senses AC voltage output and provides controlled voltage to the AC generator exciter to maintain the desired AC generator output voltage. [Voltage] and [Current] are indicated on the operator control screen on the DCS. The [Genset Voltage] panel on the DCS displays the [Voltage] AC output of the unit. The [Bus Voltage] panel on the DCS displays the [Voltage] AC output at the output terminal board. The [Genset Current] screen on the DCS displays the output of the unit in amperes.

TECHNICAL PRINCIPLES OF OPERATION – CONTINUED

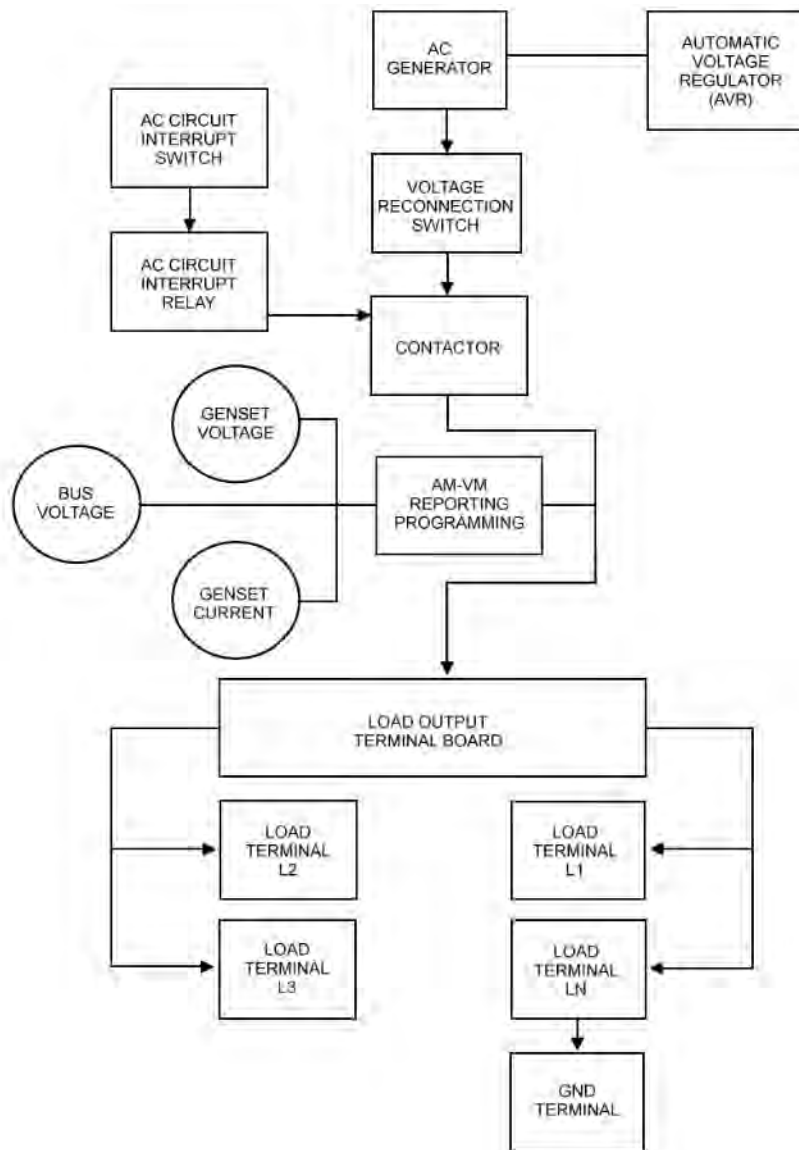


Figure 7. Output Supply System.

END OF WORK PACKAGE

CHAPTER 2

FIELD TROUBLESHOOTING PROCEDURES

FOR

AMMPS 5 KW GENERATOR SET

FIELD MAINTENANCE

FIELD TROUBLESHOOTING INDEX

GENERAL TROUBLESHOOTING INFORMATION

Troubleshooting procedures are designed to isolate AMMPS faults to the LRU level. Troubleshooting techniques apply to all AMMPS components as indicated.

Troubleshooting procedures list the symptoms, malfunctions, and corrective actions required to resolve the problem(s). Perform all steps in the order they appear in the WP. Troubleshooting procedures are listed according to symptom, followed by the malfunction, then any corrective action(s). All necessary references to procedures/instructions can be found within the applicable Troubleshooting WP (see the Malfunction/Symptom Index below).

The DCS constantly monitors the engine sensors for abnormal conditions, such as low oil pressure and high coolant temperature. If any of these conditions occur, the DCS control panel display screen will display a message indicating a fault or warning code. The system will shut down if a fault code is indicated. The system will not normally shut down from warning codes. If a warning is indicated but not addressed, it may become a fault. If a malfunction or failure occurs during an operation or performance check, perform troubleshooting IAW the Malfunction/Symptom Index and any displayed fault or warning codes (WP 0006, Warning and Fault Codes). Troubleshooting is offered in two formats when necessary: a fault with a DCS code and a fault without a DCS code. Always check DCS screen for any warning or fault codes before performing troubleshooting procedures.

DO NOT BEGIN A TASK UNTIL:

- You understand the task.
- You have the tools and equipment you need.

MALFUNCTION/SYMPTOM INDEX

The Malfunction/Symptom Index is a quick reference for locating troubleshooting procedures. Troubleshooting procedures are arranged based on the location of the malfunction (i.e. engine, exhaust system, cooling system) and the presence of a DCS code.

DCS Fault/Warning Codes

WP 0006, Warning and Fault Codes describes each fault and warning code with applicable reference. When applicable, there are two versions for each troubleshooting system WP: faults with a DCS code and faults without a DCS code.

Operational Checkout

Field maintenance is responsible for performing operational checkout procedures (WP 0005, Operational Checkout) prior to determining generator set as operational or before detailed troubleshooting is attempted.

Indications from Manual Troubleshooting Techniques

Field maintenance is responsible for performing manual troubleshooting techniques, including continuity tests and voltage checks.

After Corrective Action

After the corrective action is completed, the equipment must be tested to verify that the problem is corrected. Locate the malfunction in the troubleshooting procedures and perform the test or inspection. If the correct response is not obtained, continue troubleshooting all suspected malfunctions and performing corresponding corrective actions until the equipment is operational or is replaced with operational equipment.

GENERAL TROUBLESHOOTING INFORMATION – CONTINUED**Specific Troubleshooting Procedures**

This manual cannot list all malfunctions that may occur or all tests or inspections and corrective actions. If the malfunction encountered is not listed or is not corrected by the listed corrective action, replace the lowest level LRU component that will remedy the malfunction.

SYMPTOM TROUBLESHOOTING PROCEDURES INDEX

Malfunction/Symptom	Troubleshooting Procedure
----------------------------	----------------------------------

COOLING SYSTEM

- | | |
|--|---------|
| 1. Symptom: [Fault 151: High Coolant Temperature] displayed on DCS screen | WP 0007 |
| 2. Malfunction: Low coolant level, improper type used, or clogged cooling fins in radiator | WP 0007 |
| 3. Malfunction: Loose, defective, or improperly fitted radiator cap or coolant overflow bottle cap | WP 0007 |
| 4. Malfunction: Coolant system leak | WP 0007 |
| 5. Malfunction: Inoperable thermostat | WP 0007 |
| 6. Malfunction: Inoperable cooling fan | WP 0007 |
| 7. Malfunction: Defective temperature sensor | WP 0007 |
| 8. Malfunction: Generator set overload | WP 0007 |
| 9. Malfunction: Excessive slack in battery-charging alternator belt causing water pump malfunction | WP 0007 |
| 10. Malfunction: Improperly operating water pump | WP 0007 |
| 11. Malfunction: Insufficient cooling effect of radiator | WP 0007 |
| 12. Malfunction: Low engine oil level | WP 0007 |
| 13. Malfunction: Clogged muffler or clog in exhaust system | WP 0007 |
| 14. Malfunction: Engine used at high temperatures or at high altitude | WP 0007 |
| 15. Malfunction: Improper fuel injection | WP 0007 |
| 16. Malfunction: Incorrect fuel injection timing or governor actuator fault | WP 0007 |
| 17. Malfunction: Internal engine problem | WP 0007 |
| 18. Symptom: [Warning 146: Pre-High Coolant Temperature] displayed on DCS screen | WP 0007 |
| 19. Malfunction: Cooling system malfunction | WP 0007 |

ELECTRICAL SYSTEM TROUBLESHOOTING WITH A DCS CODE

- | | |
|--|---------|
| 20. Symptom: [Fault 115: Speed Signal Lost] displayed on DCS screen | WP 0008 |
| 21. Malfunction: Engine speed sensor malfunction | WP 0008 |
| 22. Symptom: [Fault 1433: Local E-Stop] displayed on DCS screen | WP 0008 |
| 23. Malfunction: Malfunctioning EMERGENCY STOP pushbutton or malfunctioning DCS | WP 0008 |
| 24. Symptom: [Fault 1434: Remote E-Stop] displayed on DCS screen | WP 0008 |
| 25. Malfunction: Defective remote operating cable, pins on DCS, or remote operating source | WP 0008 |
| 26. Symptom: [Fault 1445: Short Circuit] displayed on DCS screen | WP 0008 |
| 27. Malfunction: Load cables have been shorted or overloaded | WP 0008 |
| 28. Symptom: [Fault 1446: High AC Voltage] displayed on DCS screen | WP 0008 |
| 29. Malfunction: Incorrect setting or shorted load | WP 0008 |
| 30. Symptom: [Fault 1447: Low AC Voltage] displayed on DCS screen | WP 0008 |
| 31. Malfunction: Overload, damage to wiring, or damage to DCS | WP 0008 |
| 32. Symptom: [Fault 1448: Underfrequency] displayed on DCS screen | WP 0008 |
| 33. Malfunction: Generator set was subjected to a reduction in speed for a period of time | WP 0008 |
| 34. Symptom: [Fault 1452: Genset Contactor Fail To Close] displayed on DCS screen | WP 0008 |
| 35. Malfunction: Contactor or wiring malfunction | WP 0008 |
| 36. Symptom: [Fault 1453: Genset Contactor Fail To Open] displayed on DCS screen | WP 0008 |
| 37. Malfunction: Contactor or wiring malfunction | WP 0008 |
| 38. Symptom: [Fault 1472: High Current] displayed on DCS screen | WP 0008 |
| 39. Malfunction: Short, overload, or AC generator malfunction | WP 0008 |
| 40. Symptom: [Fault 1918: Fuel Level Low] displayed on DCS screen | WP 0008 |

SYMPTOM TROUBLESHOOTING PROCEDURES INDEX – CONTINUED

41. Malfunction: Low fuel level or fuel level sensor malfunction	WP 0008
42. Symptom: [Fault 2335: Excitation Fault] displayed on DCS screen	WP 0008
43. Malfunction: Circuit breaker, wiring, or AC generator malfunction	WP 0008
44. Symptom: [Fault 2914: Genset AC Meter Failed] displayed on DCS screen	WP 0008
45. Malfunction: Generator set AC meter failure	WP 0008
46. Symptom: [Fault 2972: Field Overload] displayed on DCS screen	WP 0008
47. Malfunction: Faulty AC generator components or AVR	WP 0008
48. Symptom: [Fault 3664: Invalid Genset Configuration] displayed on DCS screen	WP 0008
49. Malfunction: Incorrect dip switch settings, wiring malfunction, or improper engine or AC generator combination	WP 0008
50. Symptom: [Fault 3665: Invalid Voltage Configuration] displayed on DCS screen	WP 0008
51. Malfunction: Voltage selection fault	WP 0008
52. Symptom: [Fault 3668: Output Voltage Configuration Bit 0 Changed] or [Fault 3669: Output Voltage Configuration Bit 1 Changed] displayed on DCS screen	WP 0008
53. Malfunction: Voltage selection fault	WP 0008
54. Symptom: [Fault 3673: Convenience Receptacle AC Meter Failed] displayed on DCS screen	WP 0008
55. Malfunction: Convenience receptacle AC meter failed	WP 0008
56. Symptom: [Fault 3677: Genset Config Factory Test Fault] displayed on DCS screen	WP 0008
57. Malfunction: Factory calibration error	WP 0008
58. Symptom: [Warning 135: Oil Pressure Sensor High] displayed on DCS screen	WP 0008
59. Malfunction: Voltage above normal or shorted to a high source	WP 0008
60. Symptom: [Warning 141: Oil Pressure Sensor Low] displayed on DCS screen	WP 0008
61. Malfunction: Voltage below normal or shorted to a low source	WP 0008
62. Symptom: [Warning 144: Coolant Temp Sensor OOR High] displayed on DCS screen	WP 0008
63. Malfunction: Defective temperature sensor, poor wiring connection, or a short	WP 0008
64. Symptom: [Warning 145: Coolant Temp Sensor OOR Low] displayed on DCS screen	WP 0008
65. Malfunction: Voltage below normal or shorted to a low source	WP 0008
66. Symptom: [Warning 319: Real Time Clock Error] displayed on DCS screen	WP 0008
67. Malfunction: Clock no longer accurate due to temporary power loss or backup battery failure	WP 0008
68. Symptom: [Warning 441: Low Battery Voltage] displayed on DCS screen	WP 0008
69. Malfunction: Battery or charging failure	WP 0008
70. Symptom: [Warning 442: High Battery Voltage] displayed on DCS screen	WP 0008
71. Malfunction: Alternator or DCS failure	WP 0008
72. Symptom: [Warning 1131: Battle Short Active] displayed on DCS screen	WP 0008
73. Malfunction: BATTLESHORT switch malfunction	WP 0008
74. Symptom: [Warning 1417: Power Down Failure] displayed on DCS screen	WP 0008
75. Malfunction: DCS malfunction	WP 0008
76. Symptom: [Warning 1441: Low Fuel Level] displayed on DCS screen	WP 0008
77. Malfunction: Low fuel level or sensor malfunction	WP 0008
78. Symptom: [Warning 1442: Weak Battery] displayed on DCS screen	WP 0008
79. Malfunction: Battery connections are loose or batteries are insufficiently charged	WP 0008
80. Malfunction: Loose belt, defective battery-charging alternator, or defective electrical component	WP 0008
81. Symptom: [Warning 1444: KW Overload] displayed on DCS screen	WP 0008
82. Malfunction: Load cable or wiring malfunction	WP 0008
83. Symptom: [Warning 1449: Overfrequency] displayed on DCS screen	WP 0008
84. Malfunction: Generator AC output frequency is high	WP 0008
85. Symptom: [Warning 1451: Genset/Bus Voltage Mismatch] displayed on DCS screen	WP 0008
86. Malfunction: DCS fault	WP 0008
87. Symptom: [Warning 1469: Speed/Hz Mismatch] displayed on DCS screen	WP 0008
88. Malfunction: Speed sensor error or flywheel damage	WP 0008
89. Symptom: [Warning 1471: High Current Warning] displayed on DCS screen	WP 0008
90. Malfunction: Short, overload, or AC generator malfunction	WP 0008
91. Symptom: [Warning 1689: Reset Real Time Clock] displayed on DCS screen	WP 0008

SYMPTOM TROUBLESHOOTING PROCEDURES INDEX – CONTINUED

92. Malfunction: Clock no longer accurate due to temporary power loss or backup battery failure	WP 0008
93. Symptom: [Warning 2336: Checksum Fault] displayed on DCS screen	WP 0008
94. Malfunction: Calibration file error	WP 0008
95. Symptom: [Warning 2915: Genset Bus AC Meter Failed] displayed on DCS screen	WP 0008
96. Malfunction: Generator set Bus AC meter failed	WP 0008
97. Symptom: [Warning 2917: Genset Bus Voltage High] displayed on DCS screen	WP 0008
98. Malfunction: Paralleling or voltage sense fault	WP 0008
99. Symptom: [Warning 2936: Fuel Level Sensor High] displayed on DCS screen	WP 0008
100. Malfunction: Fuel level sensor malfunction	WP 0008
101. Symptom: [Warning 2937: Fuel Level Sensor Low] displayed on DCS screen	WP 0008
102. Malfunction: Fuel level sensor malfunction	WP 0008
103. Symptom: [Warning 2967: Governor Fault] displayed on DCS screen	WP 0008
104. Malfunction: Governor actuator malfunction	WP 0008
105. Symptom: [Warning 2968: AVR Fault] displayed on DCS screen	WP 0008
106. Malfunction: Wiring or AC generator failure	WP 0008
107. Symptom: [Warning 3662: Battery Discharge] displayed on DCS screen	WP 0008
108. Malfunction: Loose belt, defective battery-charging alternator, or defective electrical component .	WP 0008
109. Symptom: [Warning 3666: Master Control Switch Configuration] displayed on DCS screen	WP 0008
110. Malfunction: Engine control switch fault	WP 0008
111. Symptom: [Warning 3672: Automatic Field Flash Not Complete] displayed on DCS screen	WP 0008
112. Malfunction: Wiring or DCS malfunction	WP 0008
113. Symptom: [Warning 3674: Genset Configuration Change] displayed on DCS screen	WP 0008
114. Malfunction: Incorrect dip switch settings, wiring malfunction, or improper engine or AC generator combination	WP 0008

ELECTRICAL SYSTEM TROUBLESHOOTING WITHOUT A DCS CODE

115. Symptom: DCS indicates no power available and no lighted display	WP 0009
116. Malfunction: Battery malfunction	WP 0009
117. Malfunction: Circuit breaker or wiring malfunction	WP 0009
118. Malfunction: Defective DCS	WP 0009
119. Symptom: EMERGENCY STOP pushbutton fails to stop generator set	WP 0009
120. Malfunction: EMERGENCY STOP pushbutton failure	WP 0009
121. Symptom: No power to convenience receptacle or convenience receptacle fails to work	WP 0009
122. Malfunction: Convenience receptacle is defective or has been subjected to a ground fault condition	WP 0009
123. Symptom: Circuit interrupter will not close or open	WP 0009
124. Malfunction: Contactor or wiring malfunction	WP 0009
125. Symptom: Hour meter is no longer recording operating hours	WP 0009
126. Malfunction: Defective hour meter	WP 0009

ENGINE SYSTEM TROUBLESHOOTING WITH A DCS CODE

127. Symptom: [Fault 234: Overspeed Shutdown] displayed on DCS screen	WP 0010
128. Malfunction: Large block load removal or vapor drawn into intake air passage	WP 0010
129. Symptom: [Fault 359: Fail to Start] displayed on DCS screen	WP 0010
130. Malfunction: Fuel tank is empty	WP 0010
131. Malfunction: Dirty air cleaner element, intake air hose restriction, or excess backpressure	WP 0010
132. Malfunction: Fuel system malfunction	WP 0010
133. Malfunction: Fuel injection timing incorrect or governor actuator malfunction	WP 0010
134. Malfunction: Improper clearance (open or close timing) of intake/exhaust valves	WP 0010
135. Malfunction: Cold weather conditions	WP 0010
136. Malfunction: Leaking cylinder head gasket	WP 0010
137. Malfunction: Fuel injection malfunction	WP 0010

SYMPTOM TROUBLESHOOTING PROCEDURES INDEX – CONTINUED

138. Malfunction: Internal engine problem	WP 0010
139. Symptom: [Fault 415: Low Oil Pressure] displayed on DCS screen	WP 0010
140. Malfunction: Low engine oil level	WP 0010
141. Malfunction: Diluted engine oil	WP 0010
142. Malfunction: Defective engine oil pressure sender	WP 0010
143. Malfunction: Clogged oil strainer	WP 0010
144. Malfunction: Internal engine problem	WP 0010
145. Symptom: [Fault 1438: Fail to Crank] displayed on DCS screen	WP 0010
146. Malfunction: DEAD CRANK SWITCH is not in NORMAL position or will not turn over engine	WP 0010
147. Malfunction: Battery connections are loose or batteries are insufficiently charged	WP 0010
148. Malfunction: Defective starter or flywheel	WP 0010
149. Malfunction: Defective wiring or DCS	WP 0010
150. Symptom: [Warning 143: Pre-Low Oil Pressure] displayed on DCS screen	WP 0010
151. Malfunction: Engine oil malfunction	WP 0010
152. Symptom: [Warning 1992: High Speed Warning] displayed on DCS screen	WP 0010
153. Malfunction: Engine speed malfunction	WP 0010

ENGINE SYSTEM TROUBLESHOOTING WITHOUT A DCS CODE

154. Symptom: Evidence of fluid leakage found around engine	WP 0011
155. Malfunction: Engine is leaking oil	WP 0011
156. Malfunction: Engine is leaking coolant	WP 0011
157. Malfunction: Engine is leaking fuel	WP 0011
158. Symptom: Engine cranks slowly and fails to start	WP 0011
159. Malfunction: Battery connections are loose or batteries are insufficiently charged	WP 0011
160. Malfunction: Dirty air cleaner element or intake air restriction	WP 0011
161. Malfunction: Fuel system malfunction	WP 0011
162. Malfunction: Fuel injection timing incorrect or governor actuator malfunction	WP 0011
163. Malfunction: Cold weather conditions	WP 0011
164. Malfunction: Starter is defective/wiring is incorrect	WP 0011
165. Malfunction: Flywheel is defective	WP 0011
166. Malfunction: Fuel injection malfunction	WP 0011
167. Malfunction: Internal engine problem	WP 0011
168. Symptom: Engine will not shut down	WP 0011
169. Malfunction: Governor actuator malfunction	WP 0011
170. Malfunction: Engine control switch fault	WP 0011
171. Symptom: Engine cranks normally but fails to start	WP 0011
172. Malfunction: Engine system malfunction	WP 0011
173. Symptom: Engine starts but stops after starting	WP 0011
174. Malfunction: No or low fuel	WP 0011
175. Malfunction: Fuel system malfunction	WP 0011
176. Malfunction: Dirty air cleaner element or intake air restriction	WP 0011
177. Malfunction: Fuel injection timing incorrect or governor actuator malfunction	WP 0011
178. Malfunction: Engine control switch fault	WP 0011
179. Malfunction: Fuel injection or DCS malfunction	WP 0011
180. Symptom: Engine stops suddenly during normal operation	WP 0011
181. Malfunction: Engine malfunction	WP 0011
182. Symptom: Engine runs erratically, performs poorly (does not develop full power), or misfires	WP 0011
183. Malfunction: Dirty air cleaner element	WP 0011
184. Malfunction: Insufficient oil level	WP 0011
185. Malfunction: Fuel system malfunction	WP 0011
186. Malfunction: Fuel injection timing or governor actuator malfunction	WP 0011
187. Malfunction: Valves improperly adjusted	WP 0011
188. Malfunction: Fuel injection malfunction	WP 0011

SYMPTOM TROUBLESHOOTING PROCEDURES INDEX – CONTINUED

189. Malfunction: Internal engine problem	WP 0011
190. Symptom: Engine stability or hunting problems	WP 0011
191. Malfunction: High or low ambient temperatures	WP 0011
192. Symptom: Excessive oil consumption	WP 0011
193. Malfunction: Oil change overdue, incorrect grade or type (for ambient temperature range), or oil level too high	WP 0011
194. Malfunction: Leakage from oil lines, oil filter, or valve cover	WP 0011
195. Malfunction: Diluted engine oil	WP 0011
196. Malfunction: Leaking crankcase rear bearing case cover seal	WP 0011
197. Malfunction: Crankcase breather hose clogged	WP 0011
198. Malfunction: Improper seal of oil pan or clogged oil strainer	WP 0011
199. Malfunction: Fuel injection malfunction	WP 0011
200. Malfunction: Internal engine problem	WP 0011
201. Symptom: Engine knocks or makes excessive noise	WP 0011
202. Malfunction: Oil level low	WP 0011
203. Malfunction: Fuel injection or governor actuator malfunction	WP 0011
204. Malfunction: Valves improperly adjusted	WP 0011
205. Malfunction: Internal engine problem	WP 0011
206. Symptom: Abnormal or high pitched ascending and descending sounds heard from engine compartment	WP 0011
207. Malfunction: Dirty air cleaner element or intake air restriction	WP 0011
208. Malfunction: Loose battery-charging alternator belt or defective pulleys	WP 0011
209. Malfunction: Exhaust system malfunction	WP 0011
210. Malfunction: Engine problem	WP 0011
211. Symptom: White smoke seen emitting from engine compartment	WP 0011
212. Malfunction: Coolant leak	WP 0011
213. Malfunction: Fuel injection timing or governor actuator malfunction	WP 0011
214. Malfunction: Internal engine problem	WP 0011
215. Symptom: Blue or black smoke from engine compartment with strong odors	WP 0011
216. Malfunction: Wires burning	WP 0011
217. Symptom: Oil mixed with coolant	WP 0011
218. Malfunction: Leaking cylinder head assembly gasket or internal engine problem	WP 0011
219. Symptom: Oil mixed with fuel	WP 0011
220. Malfunction: Internal engine problem	WP 0011
221. Symptom: Cold weather starting aids fail to work properly	WP 0011
222. Malfunction: Cold weather starting aid malfunction	WP 0011

EXHAUST SYSTEM TROUBLESHOOTING WITHOUT A DCS CODE

223. Symptom: High pitched hiss or whistle heard at exhaust outlet with a decrease in engine performance	WP 0012
224. Malfunction: High backpressure or restriction in exhaust system	WP 0012
225. Malfunction: Internal engine problem	WP 0012
226. Symptom: Abnormal sound heard in exhaust system with a decrease in engine performance	WP 0012
227. Malfunction: Exhaust system leak	WP 0012
228. Malfunction: Internal engine problem	WP 0012
229. Symptom: Intermittent hissing or popping noise is heard when engine is running	WP 0012
230. Malfunction: Exhaust manifold gasket leak	WP 0012
231. Symptom: Buzzing or rattling sound heard	WP 0012
232. Malfunction: Loose or missing hardware of exhaust component	WP 0012
233. Symptom: Engine emits blue or black smoke with insufficient engine output	WP 0012
234. Malfunction: Overloaded generator set	WP 0012
235. Malfunction: Dirty air cleaner element	WP 0012
236. Malfunction: Obstruction in air intake system	WP 0012

SYMPTOM TROUBLESHOOTING PROCEDURES INDEX – CONTINUED

237. Malfunction: High backpressure or restriction in exhaust system	WP 0012
238. Malfunction: Improper or contaminated fuel	WP 0012
239. Malfunction: Improper open or close timing of intake/exhaust valves	WP 0012
240. Malfunction: Too much oil in oil pan/too much oil added	WP 0012
241. Malfunction: Engine used at high temperatures or at high altitude	WP 0012
242. Malfunction: Fuel injection timing incorrect or governor actuator malfunction	WP 0012
243. Malfunction: Internal engine problem	WP 0012
244. Symptom: Engine emits white exhaust smoke	WP 0012
245. Malfunction: Fuel contaminated or improper fuel used	WP 0012
246. Malfunction: Excessive slack in battery-charging alternator belt causing water pump malfunction	WP 0012
247. Malfunction: Clogged exhaust pipe or muffler	WP 0012
248. Malfunction: Clogged air filter	WP 0012
249. Malfunction: Improper intake and exhaust valve open/closure	WP 0012
250. Malfunction: Engine used at high temperatures or at high altitude	WP 0012
251. Malfunction: Fuel injection timing incorrect or governor actuator malfunction	WP 0012
252. Malfunction: Internal engine problem	WP 0012

WINTERIZATION KIT

253. Symptom: [Warning 3663: Winterization Kit Failure to Heat] displayed on DCS screen	WP 0013
254. Malfunction: Fuel tank is empty	WP 0013
255. Malfunction: Clogged intake port	WP 0013
256. Malfunction: Clogged exhaust pipe	WP 0013
257. Malfunction: Clogged winterization kit fuel pump or malfunctioning fuel pump	WP 0013
258. Malfunction: Winterization kit wiring or DCS failure	WP 0013
259. Symptom: [Warning 3671: Winterization Kit Low Voltage Warning] displayed on DCS screen	WP 0013
260. Malfunction: Battery connections are loose or batteries are insufficiently charged	WP 0013
261. Malfunction: Winterization kit wiring or DCS failure	WP 0013
262. Symptom: Winterization kit fails to turn off	WP 0013
263. Malfunction: Defective flame or heat sensor	WP 0013
264. Symptom: Winterization kit activates under usual operating conditions	WP 0013
265. Malfunction: Defective temperature sensor	WP 0013

END OF WORK PACKAGE

FIELD MAINTENANCE

OPERATIONAL CHECKOUT

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Personnel Required

91D (1)

References

WP 0006, Warning and Fault Codes
 WP 0008, Electrical System Troubleshooting with a DCS Code
 WP 0009, Electrical System Troubleshooting without a DCS Code

References - cont'd

WP 0010, Engine System Troubleshooting with a DCS Code
 WP 0011, Engine System Troubleshooting without a DCS Code
 WP 0016, Field PMCS, Including Lubrication Instructions
 WP 0017, Remove/Install DCS
 WP 0018, Repair DCS

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool

OPERATIONAL CHECKOUT**WARNING**

Exhaust discharge contains deadly gases, including carbon monoxide. Exhaust gases are most dangerous in places with poor ventilation. Do not operate generator set in an enclosed area unless exhaust discharge is properly vented. Failure to comply may cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

WARNING

High voltage is produced when generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Do not ground yourself in standing water. Never attempt to connect or disconnect load cables while the generator sets are running. Failure to comply may cause injury or death to personnel.

WARNING

High voltage power is available when the main contactor is closed. Avoid accidental contact with live components. Ensure load cables are properly connected and the load cable door is shut before closing main contactor. Ensure that personnel working with/on loads connected to the generator set are aware that main contactor is about to be closed before closing main contactor. Failure to comply may cause injury or death to personnel.

OPERATIONAL CHECKOUT – CONTINUED**WARNING**

NATO slave receptacle is electrically live at all times and is not protected by a fuse. Disconnecting the main DC circuit breaker does not ensure the circuit is dead. This circuit is only dead when the batteries are fully disconnected. Disconnect both batteries before performing maintenance on the slave receptacle. Failure to comply may cause injury or death to personnel.

WARNING

Shut down generator sets before performing inspection of load cables. Failure to comply may cause injury or death to personnel by electrocution.

WARNING

When operating, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow engine to cool before checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.

WARNING

Hearing protection is required during maintenance or repair with engine running. Failure to comply can cause hearing loss.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Do not ground yourself in standing water. Failure to comply may cause injury or death to personnel and damage to equipment.

CAUTION

Operating generator set with doors open or with panels removed for an extended length of time will cause engine to overheat. Do not operate generator with doors open or panels removed for longer than necessary to complete your task. Monitor DCS temperature indicator to prevent engine overheating. Failure to comply may cause damage to equipment.

NOTE

Always perform PMCS prior to beginning any troubleshooting procedure (WP 0016, Field PMCS, Including Lubrication Instructions).

INSPECT GROUND CONNECTION**STEP**

1. Ensure equipment conditions are met in order presented in initial setup.
2. Ensure ground rod is in ground.
3. Ensure ground cable is connected to output panel.
4. Ensure ground cable is connected to ground rod.
5. Open ground rod door on front panel.
6. Verify that all ground rods (three) have been used.

CONDITION/INDICATION

Ground rods remain in rack or ground rod is not properly installed.

INSPECT GROUND CONNECTION – CONTINUED**CORRECTIVE ACTION**

Install ground properly or install remaining ground rods as required (TM 9-6115-749-10).

STEP**WARNING**

High voltage is produced when this generator set is in operation. Do not contact output cables when operating this generator set. Failure to comply may cause injury or death to personnel.

7. Inspect connection of ground wire to ground rods for tightness and metal-to-metal contact.

CONDITION/INDICATION

Connection is loose. Metal-to-metal contact is interrupted.

CORRECTIVE ACTION

Tighten connections and reset metal-to-metal contact as required (TM 9-6115-749-10).

STEP**WARNING**

Shut down generator sets before performing inspection of load cables. Failure to comply may cause injury or death to personnel by electrocution.

8. Open output box assembly door.
9. Inspect connection of ground wire to ground post on output terminal board for tightness and metal-to-metal contact.

CONDITION/INDICATION

Connection is loose. Metal-to-metal contact is interrupted.

CORRECTIVE ACTION

Tighten connections and reset metal-to-metal contact as required (TM 9-6115-749-10).

CHECK DIGITAL CONTROL SCREEN (DCS) FUNCTION**STEP**

1. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).

NOTE

Under normal operating conditions, the control panel display will take 4 sec or more to establish contact with the Display and Main Controller Boards. While contact is being established, the screen display is gray. It will be indicated in the mode and status lines as: [Genset Mode: Unknown] and [Establishing Communications]. The length of time the screen is either blank or gray depends on ambient temperature. See TM 9-6115-749-10 for cold weather operations.

CONDITION/INDICATION

Operator control screen is not operating.

CHECK DIGITAL CONTROL SCREEN (DCS) FUNCTION – CONTINUED**CORRECTIVE ACTION**

1. Ensure battery cables are connected (WP 0008, Electrical System Troubleshooting with a DCS Code and WP 0009, Electrical System Troubleshooting without DCS Code).
2. Ensure batteries are charged (WP 0008, Electrical System Troubleshooting with a DCS Code and WP 0009, Electrical System Troubleshooting without a DCS Code).
3. Ensure wires in DCS are properly seated and in working condition (WP 0017, Remove/Install DCS).
4. Test DCS (WP 0018, Repair DCS) and replace DCS as required (WP 0017, Remove/Install DCS) if batteries are connected and charged and wires are attached and working properly, but DCS does not function.

STEP

2. Turn BATTLESHORT switch ON (TM 9-6115-749-10).
3. Watch DCS for [Warning 1131: Battle Short Active].

CONDITION/INDICATION

BATTLESHORT warning does not appear on DCS screen.

CORRECTIVE ACTION

Check wiring of DCS and BATTLESHORT switch and replace as required (WP 0017, Remove/Install DCS and WP 0018, Repair DCS).

CHECK ENGINE FUNCTION**STEP**

1. Start generator set (TM 9-6115-749-10).

CONDITION/INDICATION

Engine fails to start or never reaches rated speed.

CORRECTIVE ACTION**CAUTION**

Do not crank engine in excess of 15 sec. Allow starter to cool for at least 15 sec between attempted starts. Failure to comply may cause damage to equipment.

Troubleshoot engine (WP 0010, Engine System Troubleshooting with a DCS Code and WP 0011, Engine System Troubleshooting without a DCS Code).

CHECK AC GENERATOR FUNCTIONS**CAUTION**

All of the following steps must be performed before releasing the AMMPS generator set for use. Failure to comply may cause damage to equipment.

CHECK AC GENERATOR FUNCTIONS – CONTINUED**STEP****NOTE**

04-1031 operates at 400 Hz only. 04-1031 needs to be checked for voltage/phase settings only. 04-1030 operates at 50 Hz or 60 Hz and must be checked for voltage/phase and frequency. Repeat Steps 1 through 4 with 04-1030 set at each frequency. Set frequency on DCS using adjustments screen (TM 9-6115-749-10).

1. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
2. Set AC generator voltage selection switch to: 120/240-V, single-phase operation (TM 9-6115-749-10).
3. Push FAULT RESET (TM 9-6115-749-10) to clear [Warning 3667: Voltage Configuration Change] (WP 0006, Warnings and Fault Codes).
4. Start generator set (TM 9-6115-749-10).

CONDITION/INDICATION

Output is not as requested from operator's control screen.

CORRECTIVE ACTION

Troubleshoot electrical system (WP 0008, Electrical System Troubleshooting with a DCS Code and WP 0009, Electrical System Troubleshooting without a DCS Code).

STEP**NOTE**

04-1031 operates at 400 Hz only. 04-1031 needs to be checked for voltage/phase settings only. 04-1030 operates at 50 Hz or 60 Hz and must be checked for voltage/phase and frequency. Repeat Steps 1 through 4 with 04-1030 set at each frequency. Set frequency on DCS using adjustments screen (TM 9-6115-749-10).

5. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
6. Set AC generator voltage selection switch to: 120/208 V, three-phase operation (TM 9-6115-749-10).
7. Push FAULT RESET (TM 9-6115-749-10) to clear [Warning 3667: Voltage Configuration Change] (WP 0006, Warnings and Fault Codes).
8. Start generator set (TM 9-6115-749-10).

CONDITION/INDICATION

Output is not as requested from operator's control screen.

CORRECTIVE ACTION

Troubleshoot electrical system (WP 0008, Electrical System Troubleshooting With a DCS Code and WP 0009, Electrical System Troubleshooting Without a DCS Code).

STEP**NOTE**

04-1031 operates at 400 Hz only. 04-1031 needs to be checked for voltage/phase settings only. 04-1030 operates at 50 Hz or 60 Hz and must be checked for voltage/phase and frequency. Repeat Steps 1 through 4 with 04-1030 set at each frequency. Set frequency on DCS using adjustments screen (TM 9-6115-749-10).

9. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).

CHECK AC GENERATOR FUNCTIONS – CONTINUED

10. Set AC generator voltage selection switch to: 120 VAC, single-phase operation (TM 9-6115-749-10).
11. Push FAULT RESET (TM 9-6115-749-10) to clear [Warning 3667: Voltage Configuration Change] WP 0006, Warnings and Fault Codes).
12. Start generator set (TM 9-6115-749-10).

CONDITION/INDICATION

Output is not as requested from operator's control screen.

CORRECTIVE ACTION

Troubleshoot electrical system (WP 0008, Electrical System Troubleshooting with a DCS Code and WP 0009, Electrical System Troubleshooting without a DCS Code).

STEP

13. Start generator set (TM 9-6115-749-10).
14. Allow generator set to warm up for 5 min.
15. Press AC CIRCUIT INTERRUPT button (TM 9-6115-749-10).
16. Look for CONTACTOR CLOSED indication on screen (TM 9-6115-749-10).

CONDITION/INDICATION

Contactor does not close.

CORRECTIVE ACTION

Troubleshoot electrical system (WP 0008, Electrical System Troubleshooting with a DCS Code and WP 0009, Electrical System Troubleshooting without a DCS Code).

STEP**WARNING**

High voltage is produced when this generator set is in operation. Do not contact output cables when operating this generator set. Failure to comply may cause injury or death to personnel.

17. Bring coolant to normal operating temperature and then apply a 100% rated load for 30 minutes (TM 9-6115-749-10).

CONDITION/INDICATION

Generator set will not hold rated load for 30 minutes.

CORRECTIVE ACTION

Troubleshoot electrical or engine system (WP 0008, Electrical System Troubleshooting with a DCS Code; WP 0009, Electrical System Troubleshooting without a DCS Code; WP 0010, Engine System Troubleshooting with a DCS Code; and WP 0011, Engine System Troubleshooting without a DCS Code).

END OF WORK PACKAGE

FIELD MAINTENANCE

WARNING AND FAULT CODES

INITIAL SETUP:

Personnel Required

91D (1)

References

TM 9-6115-749-10

TM 9-6115-755-13&P

WP 0007, Cooling System Troubleshooting with a DCS Code

References - cont'd

WP 0008, Electrical System Troubleshooting with a DCS Code

WP 0010, Engine System Troubleshooting with a DCS Code

WP 0013, Winterization Kit Troubleshooting

WP 0039, Service Fuel System

WP 0057, Remove/Install Current Transformers

WARNING AND FAULT CODES

The AMMPS DCS displays real-time fault and warning codes on the top two lines of the operator main screen. Faults will result in equipment shut down. Warnings indicate items that may result in faults if unattended. The descriptions displayed on-screen and listed below provide detail about the occurrence of the fault code or warning code. By accessing the [Maintenance] screen (TM 9-6115-749-10), troubleshooting suggestions can be accessed and possible solutions indicated. The DCS must be reset using FAULT RESET switch as faults and warnings are addressed. Use the codes displayed by the DCS and the "ACTION" column in Table 1 and Table 2 to resolve problems with the AMMPS system.

TROUBLESHOOTING PROCEDURE(S)

FAULT CODES

Table 1. Fault Codes.

MESSAGE WORD	MAINTENANCE SCREEN DESCRIPTION	ACTION
[Fault 115: Speed Signal Lost]	[Engine Magnetic Crankshaft Speed/Position lost both of two signals - Data Erratic Intermittent or Incorrect.]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Fault 151: High Coolant Temp]	[Engine Coolant Temperature - Data Valid but Above Normal Operational Range - Most Severe Level]	WP 0007, Cooling System Troubleshooting with a DCS Code.
[Fault 234: Overspeed Shutdown]	[Engine Crankshaft Speed/Position - Data Valid but Above Normal Operational Range - Most Severe Level]	WP 0010, Engine System Troubleshooting with a DCS Code.
[Fault 359: Fail to Start]	[Engine Failed Automatic Start - Condition Exists]	WP 0010, Engine System Troubleshooting with a DCS Code.
[Fault 415: Low Oil Pressure]	[Engine Oil Rifle Pressure - Data Valid but Below Normal Operational Range - Most Severe Level]	WP 0010, Engine System Troubleshooting with a DCS Code.

FAULT CODES – CONTINUED

Table 1. Fault Codes. – Continued

MESSAGE WORD	MAINTENANCE SCREEN DESCRIPTION	ACTION
[Fault 1433: Local E-Stop]	[Local E-Stop Button Engaged]	The local EMERGENCY STOP button has been pressed. Pull the button out. Acknowledge the faults and reset them to return to normal operating mode. If symptom continues, see WP 0008, Electrical System Troubleshooting with a DCS Code.
[Fault 1434: Remote E-Stop]	[Remote E-Stop Signal Active]	Turn off the remote emergency stop. Acknowledge the faults and reset them to return to normal operating mode. If symptom continues, see WP 0008, Electrical System Troubleshooting with a DCS Code.
[Fault 1438: Fail To Crank]	[Engine Failed To Crank]	WP 0010, Engine System Troubleshooting with a DCS Code.
[Fault 1445: Short Circuit]	[Alternator Current is Greater Than 175% of Maximum Line Current]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Fault 1446: High AC Voltage]	[AC Output Voltage is Greater Than High AC Voltage Threshold (130%)]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Fault 1447: Low AC Voltage]	[AC Output Voltage is Less Than Low AC Voltage Threshold (70%)]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Fault 1448: Underfrequency]	[Generator AC Output Frequency - Data Valid But Below Normal Operating Range - Moderately Severe Level]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Fault 1452: Genset Contactor Fail To Close]	[Genset Contactor Failed to Close Within the Specified Close Time Delay]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Fault 1453: Genset Contactor Fail To Open]	[Genset Contactor Failed to Open Within the Specified Open Time Delay]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Fault 1459: Reverse Power]	[Generator is Absorbing Power from the Bus]	Ensure orientation of current transformers is correct (WP 0057, Remove/Install Current Transformers). See TM 9-6115-755-13&P if symptom continues.
[Fault 1461: Loss of Field]	[Generator is Absorbing Reactive Power from the Bus]	TM 9-6115-755-13&P
[Fault 1472: High Current Shutdown]	[Alternator Current is Between 110% - 175% of Maximum Line Current for More Than the Shutdown Set Time]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Fault 1918: Fuel Level Low]	[Very Low Fuel Level Detected by the Analog Sensor]	Fill generator set with proper fuel (WP 0039, Service Fuel System). See WP 0008, Electrical System Troubleshooting with a DCS Code if symptom continues.

FAULT CODES – CONTINUED**Table 1. Fault Codes. – Continued**

MESSAGE WORD	MAINTENANCE SCREEN DESCRIPTION	ACTION
[Fault 2335: Excitation Fault]	[Loss of AC Phase Voltage Sensing - Condition Exists]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Fault 2914: Genset AC Meter Failed]	[Genset AC Meter Chip Failed Health Check]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Fault 2972: Field Overload]	[AVR Field at Maximum Field Drive Limit for Greater than the Maximum Field Time]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Fault 3659: Switch Box Fail To Open]	[The Switch Box Contactor Failed to Open Within Specified Open Time Delay]	TM 9-6115-755-13&P
[Fault 3664: Invalid Genset Configuration]	[Engine Model Identification Bits are Set to an Invalid Setting]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Fault 3665: Invalid Voltage Configuration]	[Output Voltage Configuration is Invalid for the Given Genset Configuration]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Fault 3668: Output Voltage Config Bit 0 Changed]	[The State of the Output Voltage Configuration Bit 0 has Changed]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Fault 3669: Output Voltage Config Bit 1 Changed]	[The State of the Output Voltage Configuration Bit 1 has Changed]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Fault 3673: Convenience Receptacle AC Meter Failed]	[Convenience Receptacle AC Meter Chip Failed Health Check]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Fault 3677: Genset Configuration Factory Test Fault]	[Genset Configuration ID Bits Do Not Match the Expected Genset Configuration]	WP 0008, Electrical System Troubleshooting with a DCS Code.

WARNING CODES**Table 2. Warning Codes.**

CODE AND PANEL TEXT	MAINTENANCE SCREEN DESCRIPTION	ACTION
[Warning 135: Oil Pressure Sensor High]	[Engine Oil Rifle Pressure 1 Sensor Circuit - Voltage Above Normal, or Shorted to High Source]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Warning 141: Oil Pressure Sensor Low]	[Engine Oil Rifle Pressure 1 Sensor Circuit - Voltage Below Normal, or Shorted to Low Source]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Warning 143: Pre-Low Oil Pressure]	[Engine Oil Rifle Pressure - Data Valid but Below Normal Operational Range - Moderately Severe Level]	WP 0010, Engine System Troubleshooting with a DCS Code.
[Warning 144: Coolant Temp Sensor OOR High]	[Engine Coolant Temperature 1 Sensor Circuit - Voltage Above Normal, or Shorted to High Source]	WP 0008, Electrical System Troubleshooting with a DCS Code.

WARNING CODES – CONTINUED**Table 2. Warning Codes. – Continued**

CODE AND PANEL TEXT	MAINTENANCE SCREEN DESCRIPTION	ACTION
[Warning 145: Coolant Temp Sensor OOR Low]	[Engine Coolant Temperature 1 Sensor Circuit - Voltage Below Normal, or Shorted to Low Source]	WP 0008, Electrical System Troubleshooting with a DCS Code
[Warning 146: Pre-High Coolant Temp]	[Engine Coolant Temperature - Data Valid but Above Normal Operational Range - Moderately Severe Level]	WP 0007, Cooling System Troubleshooting with a DCS Code.
[Warning 319: Real Time Clock Error]	[Real Time Clock Power Interrupt - Data Erratic, Intermittent, or Incorrect]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Warning 441: Low Battery Voltage]	[Battery 1 Voltage - Data Valid but Below Normal Operational Range - Moderately Severe Level]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Warning 442: High Battery Voltage]	[Battery 1 Voltage - Data Valid but Above Normal Operational Range - Moderately Severe Level]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Warning 1131: Battle Short Active]	[Battle Short Mode Active]	Displays on DCS screen when BATTLESHORT switch is ON WP 0008, Electrical System Troubleshooting with a DCS Code).
[Warning 1416: Fail to Shutdown]	[The System Has Failed to Shutdown]	Displays on DCS screen when BATTLESHORT switch is ON and a fault occurs. Switch off BATTLESHORT (TM 9-6115-749-10) as required to address fault.
[Warning 1417: Power Down Failure]	[The System Has Failed to Power Down]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Warning 1441: Low Fuel Level]	[Low Fuel Level Detected by the Analog Sensor]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Warning 1442: Weak Battery]	[Battery Voltage Below Normal Operating Voltage During Genset Startup]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Warning 1444: KW Overload]	[The KW Load on Genset is Over the Overload Warning Threshold Continuously for More Than the Overload Warning Set Time]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Warning 1449: Overfrequency]	[Generator AC Output Frequency - Data Valid But Above Normal Operating Range - Moderately Severe Level]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Warning 1451: Genset/Bus Voltage Mismatch]	[Genset Output Voltage and Bus Voltage are Out of Calibration]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Warning 1456: Bus Out Of Synchronization Range]	[Bus Voltage and/or Frequency are Outside Set Limits for Synchronizing]	TM 9-6115-755-13&P

WARNING CODES – CONTINUED**Table 2. Warning Codes. – Continued**

CODE AND PANEL TEXT	MAINTENANCE SCREEN DESCRIPTION	ACTION
[Warning 1457: Fail To Synchronize]	[Genset Failed to Synchronize within Set Time]	TM 9-6115-755-13&P
[Warning 1458: Synch Phase Rotation Mismatch]	[Genset and Bus Phase Rotations are Reading Opposite for More Than the Dedicated Set Time]	TM 9-6115-755-13&P
[Warning 1469: Speed/Hz Mismatch]	[Genset Measured Speed and AC Output Frequency Conflict - Condition Exists]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Warning 1471: High Current Warning]	[Alternator Current Reading Between 110% - 175% of Maximum Line Current for More than the Warning Set Time]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Warning 1689: Reset Real Time Clock]	[Power to the RTC Chip has been Lost, Clock no Longer Accurate]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Warning 1992: High Speed Warning]	[Engine Crankshaft Speed/Position - Data Valid but Above Normal Operational Range - Moderately Severe Level]	WP 0010, Engine System Troubleshooting with a DCS Code.
[Warning 2336: Checksum Fault]	[The Controller Checksum Calculation Differs From the Calibration Download]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Warning 2915: Gen Bus AC Meter Failed]	[Genset Bus AC Meter Chip Failed Health Check]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Warning 2917: Genset Bus Voltage High]	[Genset Bus Voltage - Voltage Above Normal, or Shorted to High Source]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Warning 2936: Fuel Level Sensor High]	[Fuel Level OOR High Fault from the I/O Module]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Warning 2937: Fuel Level Sensor Low]	[Fuel Level OOR Low Fault from the I/O Module]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Warning 2967: Governor Fault]	[The Governor Fault Output is Active]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Warning 2968: AVR Fault]	[The AVR Fault Output is Active]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Warning 3658: Switch Box Fail To Close]	[The Switch Box Contactor Failed to Close Within Specified Close Time Delay]	TM 9-6115-755-13&P
[Warning 3661: Maintenance Item is Active]	[The Time Interval for a Genset Maintenance Item or Deferred Maintenance Item has Expired and Requires a Maintenance Action]	Address maintenance item and perform as required. Reset code once maintenance item is addressed (TM 9-6115-749-10).
[Warning 3662: Battery Discharge]	[Battery Discharge Condition Detected]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Warning 3663: Winterization Kit Failure to Heat]	[Winterization Kit Failed to Heat Engine Coolant]	WP 0013, Winterization Kit Troubleshooting.

WARNING CODES – CONTINUED**Table 2. Warning Codes. – Continued**

CODE AND PANEL TEXT	MAINTENANCE SCREEN DESCRIPTION	ACTION
[Warning 3666: Master Control Switch Configuration]	[The Number of Active Master Control Switch Inputs is Not Equal to 1]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Warning 3667: Voltage Configuration Change]	[The Output Voltage Configuration has Changed]	Displays on DCS screen when voltage selection switch is used to changed the generator set voltage configuration (TM 9-6115-749-10). Push FAULT RESET switch to clear fault on DCS display.
[Warning 3671: Winterization Kit Low Voltage Warning]	[The Genset Battery Voltage is Too Low to Run Winterization Kit]	WP 0013, Winterization Kit Troubleshooting.
[Warning 3672: Automatic Field Flash Not Complete]	[The Field Flash Cycle did not Complete Successfully]	WP 0008, Electrical System Troubleshooting with a DCS Code.
[Warning 3674: Genset Configuration Change]	[The Genset Configuration has Changed]	Displays on DCS screen when the DCS recognize the configuration has changed. This warning is most likely when a DCS is moved from one size generator set to a different size generator set. Push FAULT RESET and continue normal use of the generator set. If symptom continues, see WP 0008, Electrical System Troubleshooting with a DCS Code.
[Warning 3678: Genset Frequency Changed]	[The Genset Frequency has Changed]	04-1030 only. Displays on DCS screen after changing generator set frequency from 60 Hz to 50 Hz or 50 Hz to 60 Hz (TM 9-6115-749-10). Push FAULT RESET switch to clear fault on DCS display.

END OF WORK PACKAGE

FIELD MAINTENANCE
COOLING SYSTEM TROUBLESHOOTING WITH A DCS CODE

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Personnel Required

91D (1)

References

TM 9-6115-749-10
 WP 0008, Electrical System Troubleshooting with a DCS Code
 WP 0011, Engine System Troubleshooting without a DCS Code
 WP 0012, Exhaust System Troubleshooting Without a DCS Code
 WP 0016, Field PMCS, Including Lubrication Instructions
 WP 0017, Remove/Install DCS
 WP 0018, Repair DCS
 WP 0021, Service Cooling System
 WP 0022, Remove/Install Coolant Recovery System
 WP 0023, Remove/Install Cooling Fan

References - cont'd

WP 0024, Remove/Install Radiator Hose and Tube Assemblies
 WP 0025, Remove/Install Winterization Kit Components
 WP 0027, Remove/Install Radiator
 WP 0036, Remove/Install Batteries
 WP 0059, Remove/Install Engine Wiring Harness
 WP 0061, Remove/Install Relay Panel
 WP 0062, Test Engine Compression
 WP 0064, Remove/Install 50/60 Hz Engine Assembly
 WP 0065, Remove/Install 400 Hz Engine Assembly
 WP 0069, Remove/Install Fuel Injector
 WP 0071, Remove/Install Fuel Injection Pump
 WP 0073, Remove/Install Thermostat
 WP 0074, Remove/Install Water Pump
 WP 0076, Remove/Install Battery-Charging Alternator Belt
 WP 0093, General Maintenance
 WP 0096, Replace Cylinder Head Gasket
 Foldout Pages

TROUBLESHOOTING PROCEDURE(S)**COOLING SYSTEM TROUBLESHOOTING WITH A DCS CODE****WARNING**

When operating, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow engine to cool before checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.

WARNING

Cooling system operates at high temperature and pressure. Contact with high-pressure steam and/or liquids can cause burns and scalding. Shut down generator set and allow system to cool before performing checks, services, and maintenance. Wear gloves, additional protective clothing, and goggles as required. Failure to comply may cause injury or death to personnel.

TROUBLESHOOTING PROCEDURES – CONTINUED**WARNING**

Hot coolant can burn. If the radiator cap is hot to the touch, it is too hot to open. Allow the coolant to cool before opening the radiator cap. Wear gloves, additional protective clothing, and goggles as required. Contact with high-pressure steam and/or liquids can cause burns and scalding. Failure to comply may cause injury or death to personnel.

WARNING

Engine coolant is toxic to eyes and poisonous if ingested. Eye protection is required when working with engine coolant. Avoid repeated or prolonged contact. Failure to comply may cause injury or death to personnel.

NOTE

Always perform PMCS prior to beginning any troubleshooting procedure (WP 0016).

Read the entire corrective action sequence before beginning steps to complete corrective action for a malfunction.

FAULT RESET switch must be pushed to clear each fault code as it is addressed.

Capture spilled fluids and dispose of IAW local SOP.

SYMPTOM

[Fault 151: High Coolant Temperature] displayed on DCS screen.

NOTE

[Warning 146: Pre-High Coolant Temperature] is displayed on the DCS screen when coolant temperature reaches 220 °F (104.4 °C). [Fault 151: High Coolant Temperature] is displayed on the DCS screen and results in a generator set shutdown when coolant temperature reaches 230 °F (110 °C).

MALFUNCTION

Low coolant level, improper type used, or clogged cooling fins in radiator.

CORRECTIVE ACTION

- STEP 1. Check coolant level in coolant overflow bottle first and then check coolant level in radiator. Add coolant as required (TM 9-6115-749-10).
- STEP 2. Check radiator for excessive debris or clogs on cooling fins. Clean as required (WP 0021, Service Cooling System).
- STEP 3. If symptom continues, verify proper type of coolant is used (TM 9-6115-749-10).
- STEP 4. If improper coolant or mixture is suspected, drain cooling system and fill with proper coolant (WP 0021, Service Cooling System).
- STEP 5. If leak is suspected or symptom continues, proceed to next malfunction.

MALFUNCTION

Loose, defective, or improperly fitted radiator cap or coolant overflow bottle cap.

TROUBLESHOOTING PROCEDURES – CONTINUED**CORRECTIVE ACTION**

- STEP 1. Check for loose, improperly fitted, or visibly defective radiator cap and coolant overflow bottle cap.
- STEP 2. Install properly if loose or improperly fitted or replace if damaged (WP 0027, Remove/Install Radiator and WP 0022, Remove/Install Coolant Recovery System).
- STEP 3. If properly secured, test radiator cap to determine proper operation (WP 0021, Service Cooling System).
- STEP 4. If defective, replace as required (WP 0027, Remove/Install Radiator).
- STEP 5. Check coolant level in coolant overflow bottle and radiator. Add coolant as required (TM 9-6115-749-10).
- STEP 6. If symptom continues, proceed to next malfunction.

MALFUNCTION

Coolant system leak.

CORRECTIVE ACTION

- STEP 1. Perform a cooling system pressure check at radiator (WP 0021, Service Cooling System).
- STEP 2. If loss of pressure is observed on gauge of cooling system tester, proceed to Step 4.
- STEP 3. If no loss of pressure is observed, proceed to next malfunction.
- STEP 4. Check radiator and coolant overflow bottle hoses and clamps (WP 0022, Remove/Install Coolant Recovery System and WP 0024, Remove/Install Radiator Hose and Tube Assemblies), hoses and clamps at water pump (WP 0074, Remove/Install Water Pump), and hoses and clamps at winterization kit (as required) (WP 0025, Remove/Install Winterization Kit Components) for signs of leakage. Replace any hose or clamp as necessary.
- STEP 5. Check radiator for signs of leaks and replace as required (WP 0027, Remove/Install Radiator).
- STEP 6. Check coolant overflow bottle for signs of leaks and replace as required (WP 0022, Remove/Install Coolant Recovery System).
- STEP 7. Check water pump and hoses for leaks. Replace water pump, hoses, or gasket as required (WP 0074, Remove/Install Water Pump).
- STEP 8. Check freeze plugs on engine for leaks. Replace freeze plugs if leaks are found (WP 0093, General Maintenance).
- STEP 9. Flush cooling system and fill as required (WP 0021, Service Cooling System).
- STEP 10. If symptom continues, proceed to next malfunction.

MALFUNCTION

Inoperable thermostat.

CORRECTIVE ACTION

- STEP 1. Test thermostat and replace as required (WP 0073, Remove/Install Thermostat).

TROUBLESHOOTING PROCEDURES – CONTINUED

STEP 2. If symptom continues, proceed to next malfunction.

MALFUNCTION

Inoperable cooling fan.

CORRECTIVE ACTION**WARNING**

Cooling fan has sharp blades. Use caution and wear gloves when removing or installing fan. Failure to comply may cause injury or death to personnel.

NOTE

Cooling fan should run at high Pulse Width Modulated (PWM) signal when coolant temperature is above 223 °F (106.1 °C). Fan speed (controlled by PWM signal) is dependent on coolant temperature.

- STEP 1. Check air intake for obstruction and remove any obstruction.
- STEP 2. Test cooling fan operation by disconnecting engine temperature sensor wire (WP 0074, Remove/Install Water Pump) or by using InPower AMMPS software (WP 0093, General Maintenance).
- STEP 3. Start generator set and allow it to reach rated speed (TM 9-6115-749-10).

NOTE

Fan should run at high PWM signal.

- STEP 4. Compare fan speed visually or with InPower AMMPS software (WP 0093, General Maintenance) to coolant temperature. See Table 1.

Table 1. Cooling Fan PWM Signal.

COOLANT TEMPERATURE °F (°C)	PERCENTAGE OF PWM
-60 °F (-51.1 °C)	0
198 °F (92.2 °C)	0
199 °F (92.7 °C)	0
200 °F (93.3 °C)	20
210 °F (98.9 °C)	51
220 °F (104.4 °C)	69
223 °F (106.1 °C)	75
227 °F (108.3 °C)	75

- STEP 5. If fan is not operating, install engine temperature sensor connector and check cooling fan circuit breaker and relay, resetting or replacing as required (WP 0061, Remove/Install Relay Panel).
- STEP 6. If cooling fan is found to be operating properly, install engine temperature sensor connector and proceed to next malfunction.

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 7. If symptom continues, remove battery ground cable (WP 0036, Remove/Install Batteries) and use wiring diagrams and a multimeter set to test continuity to check cooling fan wiring to relay panel and DCS for opens or shorts (WP 0093, General Maintenance and Foldout Pages).
- STEP 8. Replace or repair wiring or connectors as required (WP 0059, Remove/Install Engine Wiring Harness and WP 0093, General Maintenance).
- STEP 9. If symptom continues, replace cooling fan (WP 0023, Remove/Install Cooling Fan).
- STEP 10. If symptom continues, check DCS LEDs and replace as required (WP 0018, Repair DCS and WP 0017, Remove/Install DCS).

MALFUNCTION

Defective temperature sensor.

CORRECTIVE ACTION

- STEP 1. Troubleshoot IAW [Warning 144: Coolant Temp Sensor OOR High] displayed on DCS screen symptom (WP 0008, Electrical System Troubleshooting with a DCS Code).
- STEP 2. If symptom continues, proceed to next malfunction.

MALFUNCTION

Generator set overload.

CORRECTIVE ACTION

- STEP 1. Check for generator set overload by checking the generator line current indicator on the generator status display screen.
- STEP 2. Proceed to next malfunction if generator set is operating at proper load.
- STEP 3. If load is too great for the generator set, replace with a larger generator set to match load requirements.

MALFUNCTION

Excessive slack in battery-charging alternator belt causing water pump malfunction.

CORRECTIVE ACTION

- STEP 1. Check battery-charging alternator belt for proper tension and excessive wear. Adjust or replace as required (WP 0076, Remove/Install Battery-Charging Alternator Belt).

WARNING

When operating, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow engine to cool before checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.

- STEP 2. Check water pump pulley for smooth turning and proper seating of belt.

TROUBLESHOOTING PROCEDURES – CONTINUED

STEP 3. Replace water pump pulley if malfunction is detected (WP 0074, Remove/Install Water Pump).

STEP 4. If not defective, proceed to next malfunction.

MALFUNCTION

Improperly operating water pump.

CORRECTIVE ACTION**WARNING**

When operating, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow engine to cool before checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.

STEP 1. Turn shaft/pulley of water pump to feel for excessive resistance and play in the shaft.

STEP 2. Replace water pump if improper operation is suspected (WP 0074, Remove/Install Water Pump).

STEP 3. Observe engine temperature after replacement, and check for engine overheating.

STEP 4. If water pump is operating properly, proceed to next malfunction.

MALFUNCTION

Insufficient cooling effect of radiator.

CORRECTIVE ACTION

STEP 1. Check radiator for excessive debris or clogs on cooling fins. Clean as required (WP 0021, Service Cooling System).

STEP 2. Check hoses for obstructions, rust, or buildup and for signs of kinking causing restriction. Repair or replace as required (WP 0024, Remove/Install Radiator Hose and Tube Assemblies).

STEP 3. Observe engine temperature on DCS screen (TM 9-6115-749-10).

STEP 4. Replace radiator if insufficient cooling effect of radiator continues (WP 0027, Remove/Install Radiator).

STEP 5. If not defective, proceed to next malfunction.

MALFUNCTION

Low engine oil level.

CORRECTIVE ACTION

STEP 1. Add oil to the proper level (TM 9-6115-749-10).

TROUBLESHOOTING PROCEDURES – CONTINUED

STEP 2. If engine oil is low, troubleshoot lubrication system for oil consumption (WP 0011, Engine System Troubleshooting without a DCS Code).

STEP 3. If full, proceed to next malfunction.

MALFUNCTION

Clogged muffler or clog in exhaust system.

CORRECTIVE ACTION

STEP 1. Troubleshoot exhaust system for restriction (high backpressure/restriction in exhaust system) (WP 0012, Exhaust System Troubleshooting without a DCS Code).

STEP 2. If symptom continues, proceed to next malfunction.

MALFUNCTION

Engine used at high temperatures or at high altitude.

CORRECTIVE ACTION

STEP 1. Check output drop and load matching requirements (TM 9-6115-749-10). Reduce load as required (TM 9-6115-749-10).

STEP 2. If not applicable, proceed to next malfunction.

MALFUNCTION

Improper fuel injection.

CORRECTIVE ACTION**WARNING**

Fuel is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash exposed skin and change soaked clothing promptly if exposed to fuel. Failure to comply may cause injury or death to personnel.

STEP 1. Check fuel injectors for proper spray pattern and pressure rating, and replace fuel injectors as required (WP 0069, Remove/Install Fuel Injector).

STEP 2. If not defective, proceed to next malfunction.

MALFUNCTION

Incorrect fuel injection timing or governor actuator fault.

CORRECTIVE ACTION

STEP 1. Troubleshoot IAW [Warning 2967: Governor Fault] displayed on DCS screen symptom (WP 0008, Electrical System Troubleshooting with a DCS Code).

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 2. If symptom continues, check fuel injection pump timing and adjust as required (WP 0071, Remove/Install Fuel Injection Pump).
- STEP 3. Replace fuel injection pump if timing cannot be adjusted or if found defective (WP 0071, Remove/Install Fuel Injection Pump).
- STEP 4. If symptom continues, proceed to next malfunction.

MALFUNCTION

Internal engine problem.

CORRECTIVE ACTION

- STEP 1. Perform an engine compression check (WP 0062, Test Engine Compression).
- STEP 2. If compression check reveals fault, replace cylinder head gasket (WP 0096, Replace Cylinder Head Gasket).
- STEP 3. If symptom continues, replace engine (WP 0064, Remove/Install 50/60 Hz Engine Assembly or WP 0065, Remove/Install 400 Hz Engine Assembly).

SYMPTOM

[Warning 146: Pre-High Coolant Temperature] displayed on DCS screen.

MALFUNCTION

Cooling system malfunction.

CORRECTIVE ACTION

Troubleshoot IAW [Fault 151: High Coolant Temperature] displayed on DCS screen symptom.

END OF WORK PACKAGE

FIELD MAINTENANCE

ELECTRICAL SYSTEM TROUBLESHOOTING WITH A DCS CODE

INITIAL SETUP:

Test Equipment

Test Set, Electronic Systems (WP 0162, Table 2, Item 27)
 Cable, Remote Control (WP 0162, Table 2, Item 6)
 Cable, Remote Control (WP 0162, Table 2, Item 7)

Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Personnel Required

91D (1)
 Assistant (1)

References

TM 9-6115-749-10
 WP 0011, Engine System Troubleshooting without a DCS Code
 WP 0016, Field PMCS, Including Lubrication Instructions
 WP 0017, Remove/Install DCS
 WP 0018, Repair DCS
 WP 0036, Remove/Install Batteries
 WP 0039, Service Fuel System

References - cont'd

WP 0045, Remove/Install Fuel Level Sensor
 WP 0049, Remove/Install 50/60 Hz AC Generator Assembly
 WP 0050, Remove/Install 400 Hz AC Generator Assembly
 WP 0051, Test AC Generator
 WP 0052, Remove/Install Contactor
 WP 0053, Remove/Install Output Terminal Board
 WP 0054, Remove/Install Voltage Selection Switch
 WP 0057, Remove/Install Current Transformers
 WP 0058, Remove/Install Printed Circuit Board Module
 WP 0059, Remove/Install Engine Wiring Harness
 WP 0061, Remove/Install Relay Panel
 WP 0063, Test Engine Oil Pressure
 WP 0067, Remove/Install Engine Speed Sensor
 WP 0071, Remove/Install Fuel Injection Pump
 WP 0072, Remove/Install Thermostat Housing
 WP 0075, Remove/Install Battery-Charging Alternator Assembly
 WP 0076, Remove/Install Battery-Charging Alternator Belt
 WP 0085, Remove/Install Flywheel
 WP 0093, General Maintenance
 Foldout Pages

TROUBLESHOOTING PROCEDURE(S)

ELECTRICAL SYSTEM TROUBLESHOOTING WITH A DCS CODE

WARNING

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

WARNING

High voltage is produced when generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Do not ground yourself in standing water. Never attempt to connect or disconnect load cables while the generator sets are running. Failure to comply may cause injury or death to personnel.

TROUBLESHOOTING PROCEDURES – CONTINUED**WARNING**

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Do not ground yourself in standing water. Failure to comply may cause injury or death to personnel and damage to equipment.

NOTE

Always perform PMCS prior to beginning any troubleshooting procedure (WP 0016, Field PMCS, Including Lubrication Instructions).

Read the entire corrective action sequence before beginning steps to complete corrective action for a malfunction.

FAULT RESET switch must be pushed to clear each fault code as it is addressed.

SYMPTOM

[Fault 115: Speed Signal Lost] displayed on DCS screen.

MALFUNCTION

Engine speed sensor malfunction.

CORRECTIVE ACTION**WARNING**

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

- STEP 1. Inspect engine speed signal for loose wires, loose connections, and improper gap (WP 0067, Remove/Install Engine Speed Sensor).
- STEP 2. Remove engine speed sensor to clean tip, adjust engine speed sensor gap (WP 0067, Remove/Install Engine Speed Sensor), or replace or repair wiring as required (WP 0059, Remove/Install Engine Wiring Harness and WP 0093, General Maintenance).
- STEP 3. If symptom continues, remove wiring connector and use a multimeter selected for ohms scale to measure resistance of engine speed sensor between the two pins (WP 0093, General Maintenance).
- STEP 4. If value of resistance measured in Step 3 is within 225-275 Ω range, engine speed sensor is operable. Proceed to Step 6.
- STEP 5. If value of resistance measured in Step 3 is not within 225-275 Ω range, engine speed sensor is open or shorted. Replace engine speed sensor (WP 0067, Remove/Install Engine Speed Sensor).
- STEP 6. If malfunction continues, ensure battery ground cable is disconnected (WP 0036, Remove/Install Batteries) and use wiring diagrams (Foldout Pages) to check wiring from sensor to DCS for shorts or opens using a multimeter set to test continuity (WP 0093, General Maintenance).
- STEP 7. Repair or replace wiring as required (WP 0093, General Maintenance and WP 0059, Remove/Install Engine Wiring Harness).

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 8. If symptom continues, troubleshoot IAW [Warning 2967: Governor Fault] displayed on DCS screen symptom.
- STEP 9. If symptom continues, check DCS LEDs and replace DCS as required (WP 0018, Repair DCS and WP 0017, Remove/Install DCS).

SYMPTOM

[Fault 1433: Local E-Stop] displayed on DCS screen.

MALFUNCTION

Malfunctioning EMERGENCY STOP pushbutton or malfunctioning DCS.

CORRECTIVE ACTION**WARNING**

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

- STEP 1. Ensure EMERGENCY STOP pushbutton is pulled out and attempt to reset the fault code by pressing FAULT RESET switch.
- STEP 2. If symptom continues, test EMERGENCY STOP pushbutton and replace as required (WP 0018, Repair DCS).
- STEP 3. If symptom continues, check DCS LEDs and replace DCS as required (WP 0018, Repair DCS and WP 0017, Remove/Install DCS).

SYMPTOM

[Fault 1434: Remote E-Stop] displayed on DCS screen.

MALFUNCTION

Defective remote operating cable, pins on DCS, or remote operating source.

CORRECTIVE ACTION**WARNING**

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

- STEP 1. If operating from a remote source, ensure remote emergency stop was not intentionally activated from a remote source. Proceed to Step 3.
- STEP 2. If not operating from a remote source, proceed to Step 9.

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 3. Confirm reason for use of remote emergency stop and continue normal operation as required (TM 9-6115-749-10).
- STEP 4. If remote emergency stop was not intentionally activated, restart computer and reconnect to DCS (TM 9-6115-749-10).
- STEP 5. If symptom continues, inspect remote control cable and computer for damaged, missing, or bent pins where connector of remote control cable attaches.
- STEP 6. Replace remote control cable or computer as required.
- STEP 7. If symptom continues, disconnect remote control cable and use a multimeter set to check continuity to test remote control cable for opens or shorts (WP 0093, General Maintenance).
- STEP 8. Replace remote control cable as required.
- STEP 9. If symptom continues, check DCS LEDs and replace DCS as required (WP 0018, Repair DCS and WP 0017, Remove/Install DCS).

SYMPTOM

[Fault 1445: Short Circuit] displayed on DCS screen.

MALFUNCTION

Load cables have been shorted or overloaded.

CORRECTIVE ACTION**WARNING**

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

- STEP 1. Verify that load cables have been de-energized.
- STEP 2. Inspect load cables, load, and output box visually for signs of wire damage or short circuit. Repair or replace wires or components as required (WP 0053, Remove/Install Output Terminal Board, WP 0052, Remove/Install Contactor, WP 0054, Remove/Install Voltage Selection Switch, and WP 0057, Remove/Install Current Transformers).
- STEP 3. If symptom continues, check operation by disconnecting load cables from generator set and restarting generator set (TM 9-6115-749-10).
- STEP 4. If generator set reaches rated speed without fault code shutdown, shutdown generator set, verify proper load, and connect load cables (TM 9-6115-749-10). Proceed to Step 6.
- STEP 5. If generator set operation results in a fault code shutdown, proceed to Step 8.
- STEP 6. If symptom continues, ensure load cables are completely disconnected, and inspect load and load cables for shorts or opens using a multimeter set to test continuity (WP 0093, General Maintenance). Replace as required.
- STEP 7. If symptom continues, compare load demands with generator set and utilize a larger generator set if load is too great for current size generator set.

TROUBLESHOOTING PROCEDURES – CONTINUED**WARNING**

Dangerously high voltage can exist across Current Transformer (CT) output with engine operating. CT can explode if disconnected from load with engine running. Do not disconnect CT with Alternating Current (AC) generator rotating. Failure to comply may cause injury or death to personnel by electrocution.

- STEP 8. If symptom continues, check CT for cracks, signs of heat damage, and resistance (WP 0057, Remove/Install Current Transformers). Replace as required (WP 0057, Remove/Install Current Transformers).
- STEP 9. If symptom continues, use wiring diagrams and inspect CT wires from CT to printed circuit board module and from printed circuit board module to DCS for loose connections or damage (Foldout Pages).
- STEP 10. Repair or replace wiring as required (WP 0058, Remove/Install Printed Circuit Board Module, WP 0057, Remove/Install Current Transformers, WP 0017, Remove/Install DCS, and WP 0093, General Maintenance).
- STEP 11. If symptom continues, inspect wiring, connectors, and pins on connectors from the contactor to J511 on printed circuit board module for loose connections or damage. Replace as required (WP 0058, Remove/Install Printed Circuit Board Module).
- STEP 12. Inspect wiring running from contactor to output terminals and from contactor to voltage selection switch for loose connections or damage. Replace or repair as required (WP 0052, Remove/Install Contactor or WP 0093, General Maintenance).
- STEP 13. Inspect busbars on contactor for damage, and replace as required (WP 0052, Remove/Install Contactor).
- STEP 14. Inspect wiring, connectors, and pins on connectors running from the DCS to printed circuit board module for loose connections and damage. Replace as required (WP 0058, Remove/Install Printed Circuit Board Module).
- STEP 15. If symptom continues, test contactor for proper operation, and replace as required (WP 0052, Remove/Install Contactor).
- STEP 16. If symptom continues, check DCS LEDs and replace as required (WP 0018, Repair DCS and WP 0017, Remove/Install DCS).

SYMPTOM

[Fault 1446: High AC Voltage] displayed on DCS screen.

MALFUNCTION

Incorrect setting or shorted load.

CORRECTIVE ACTION

- STEP 1. Clear fault and restart generator set (TM 9-6115-749-10).
- STEP 2. If symptom continues, check operation by disconnecting load cables from generator set and restarting generator set (TM 9-6115-749-10).
- STEP 3. If generator set reaches rated speed without fault code shutdown, shutdown generator set, verify proper load, and connect load cables (TM 9-6115-749-10). Proceed to Step 5.

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 4. If generator set operation results in a fault code shutdown, troubleshoot IAW [Fault 2335: Excitation Fault] displayed on DCS screen symptom.
- STEP 5. If symptom continues, verify that voltage selection matches load requirements (TM 9-6115-749-10).
- STEP 6. Adjust as required (TM 9-6115-749-10).

WARNING

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

- STEP 7. If symptom continues, inspect load cables and cables at output box visually for signs of wire damage.
- STEP 8. Replace any damaged load cables.
- STEP 9. If symptom continues, check for use of large motors, inductive loads, AC air conditioning compressors, or other loads with large inrush currents.
- STEP 10. Reduce use of other loads while starting loads with large inrush currents and avoid sudden stopping of inrush current loads during operation.
- STEP 11. If symptom continues, ensure load cables are completely disconnected and inspect load and load cables for shorts using a multimeter set to test continuity (WP 0093, General Maintenance). Repair or replace any damaged load cables.

SYMPTOM

[Fault 1447: Low AC Voltage] displayed on DCS screen.

MALFUNCTION

Overload, damage to wiring, or damage to DCS.

CORRECTIVE ACTION

Troubleshoot IAW [Fault 1446: High AC Voltage] displayed on DCS screen symptom.

SYMPTOM

[Fault 1448: Underfrequency] displayed on DCS screen.

MALFUNCTION

Generator set was subjected to a reduction in speed for a period of time.

CORRECTIVE ACTION

- STEP 1. Disconnect load and restart engine (TM 9-6115-749-10).
- STEP 2. If symptom continues, compare load demands with generator set and utilize a larger generator set if load is too great for current size generator set.
- STEP 3. If symptom continues, confirm proper voltage and frequency settings for load usage and adjust as required (TM 9-6115-749-10).

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 4. If symptom continues, test and adjust engine speed sensor, and replace as required (WP 0067, Remove/Install Engine Speed Sensor).
- STEP 5. If symptom continues, troubleshoot IAW [Warning 2967: Governor Fault] displayed on DCS screen symptom.
- STEP 6. If symptom continues, troubleshoot engine system for fuel or air problems (poor performance) (WP 0011, Engine System Troubleshooting without a DCS Code).

SYMPTOM

[Fault 1452: Genset Contactor Fail To Close] displayed on DCS screen.

NOTE

DCS receives signal from contactor within 260 milliseconds (ms) of close operation indicating a closed contactor. [Fault 1452: Genset Contactor Fail To Close] displays on DCS screen when the DCS does not receive the signal or the contactor does not close.

MALFUNCTION

Contactor or wiring malfunction.

CORRECTIVE ACTION**WARNING**

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

WARNING

High voltage power is available when the main contactor is closed. Avoid accidental contact with live components. Ensure load cables are properly connected and the load cable door is shut before closing main contactor. Ensure that personnel working with/on loads connected to the generator set are aware that main contactor is about to be closed before closing main contactor. Failure to comply may cause injury or death to personnel.

- STEP 1. Inspect wiring, connectors, and pins on connectors from the contactor to J511 on printed circuit board module for loose connections or damage. Replace as required (WP 0058, Remove/Install Printed Circuit Board Module).
- STEP 2. Inspect wiring running from contactor to output terminals and from contactor to voltage selection switch for loose connections or damage. Replace or repair as required (WP 0052, Remove/Install Contactor and WP 0093, General Maintenance).
- STEP 3. Inspect busbars on contactor for damage and replace as required (WP 0052, Remove/Install Contactor).
- STEP 4. Inspect wiring, connectors, and pins on connectors running from the DCS to printed circuit board module for loose connections and damage. Replace as required (WP 0058, Remove/Install Printed Circuit Board Module).

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 5. If symptom continues, test contactor for proper operation, and replace as required (WP 0052, Remove/Install Contactor).

NOTE

Wires P2-S and P2-F are contactor coil energizing wires from DCS P500 to printed circuit board module J500. Wires P3-H and P3-AA are contactor auxiliary wires (indicating to DCS when contactor is open or closed) from DCS P500 to printed circuit board module J500. Wires from the contactor (K1-Y, K1-X, K1-11, and K1-12) connect to printed circuit board module J511.

- STEP 6. If symptom continues, ensure battery ground cable is disconnected (WP 0036, Remove/Install Batteries), remove connectors, and test all wiring for shorts or opens using wiring diagrams (Foldout Pages) and a multimeter set to test continuity (WP 0093, General Maintenance).
- STEP 7. Repair or replace any wiring as required and install connectors (WP 0093, General Maintenance, WP 0052, Remove/Install Contactor, WP 0058, Remove/Install Printed Circuit Board Module, and WP 0059, Remove/Install Engine Wiring Harness).
- STEP 8. If symptom continues, inspect the printed circuit board module and output terminal board for damage and replace as required (WP 0058, Remove/Install Printed Circuit Board Module and WP 0053, Remove/Install Output Terminal Board).
- STEP 9. If symptom continues, check DCS LEDs, and replace DCS as required (WP 0018, Repair DCS and WP 0017, Remove/Install DCS).

SYMPTOM

[Fault 1453: Genset Contactor Fail To Open] displayed on DCS screen.

NOTE

The DCS receives a signal from the contactor within 1 sec of when it opens. [Fault 1453: Genset Contactor Fail To Open] displays on DCS screen when the DCS does not receive the signal or the contactor does not open.

MALFUNCTION

Contactor or wiring malfunction.

CORRECTIVE ACTION**WARNING**

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

- STEP 1. Remove output box components as required to access contactor with multimeter leads (WP 0052, Remove/Install Contactor).
- STEP 2. Turn engine control switch to PRIME & RUN without starting generator set (TM 9-6115-749-10).

TROUBLESHOOTING PROCEDURES – CONTINUED**WARNING**

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Do not ground yourself in standing water. Failure to comply may cause injury or death to personnel and damage to equipment.

NOTE

Terminals X and Y on contactor are for the wires that energize the contactor coil.

- STEP 3. Test contactor coil for 24 VDC using a multimeter set to test voltage (WP 0093, General Maintenance).
- STEP 4. If 24 VDC is not detected on contactor coil, troubleshoot IAW [Fault 1452: Genset Contactor Fail To Close] displayed on DCS screen symptom.
- STEP 5. If 24 VDC is detected on contactor coil, remove connectors, and test wiring from contactor, printed circuit board, and DCS for shorts or opens using wiring diagrams (Foldout Pages) and a multimeter set to test continuity (WP 0093, General Maintenance).
- STEP 6. Repair or replace any wiring as required, and install connectors (WP 0093, General Maintenance; WP 0052, Remove/Install Contactor; WP 0058, Remove/Install Printed Circuit Board Module; and WP 0059, Remove/Install Engine Wiring Harness).
- STEP 7. If symptom continues, replace DCS (WP 0017, Remove/Install DCS).

SYMPTOM

[Fault 1472: High Current] displayed on DCS screen.

MALFUNCTION

Short, overload, or AC generator malfunction.

CORRECTIVE ACTION**WARNING**

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

WARNING

High voltage power is available when the main contactor is closed. Avoid accidental contact with live components. Ensure load cables are properly connected and the load cable door is shut before closing main contactor. Ensure that personnel working with/on loads connected to the generator set are aware that main contactor is about to be closed before closing main contactor. Failure to comply may cause injury or death to personnel.

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 1. Compare load demands with generator set capacity, and utilize a larger generator set if load is too great for current size generator set.
- STEP 2. If symptom continues, shut down generator set if not already shut down, and ensure load cables are completely disconnected (TM 9-6115-749-10).
- STEP 3. Check the load and load cables for shorts or opens using a multimeter set to test continuity (WP 0093, General Maintenance). Remove load or repair as required.
- STEP 4. Connect load and check for proper operation (TM 9-6115-749-10).
- STEP 5. If symptom continues, check CT for cracks, signs of heat damage, and resistance (WP 0057, Remove/Install Current Transformers). Replace as required (WP 0057, Remove/Install Current Transformers).
- STEP 6. If symptom continues, use wiring diagrams and inspect CT wires from CT to printed circuit board module and from printed circuit board module to DCS for loose connections or damage (Foldout Pages).
- STEP 7. Repair or replace wiring as required (WP 0058, Remove/Install Printed Circuit Board Module; WP 0057, Remove/Install Current Transformers; WP 0017, Remove/Install DCS; and WP 0093, General Maintenance).
- STEP 8. If symptom continues, inspect wiring, connectors, and pins on connectors from the contactor to J511 on printed circuit board module for loose connections or damage. Replace as required (WP 0057, Remove/Install Current Transformers).
- STEP 9. Inspect wiring running from contactor to output terminals and from contactor to voltage selection switch for loose connections or damage. Replace or repair as required (WP 0052, Remove/Install Contactor or WP 0093, General Maintenance).
- STEP 10. Inspect busbars on contactor for damage and replace as required (WP 0052, Remove/Install Contractor).
- STEP 11. Inspect wiring, connectors, and pins on connectors running from the DCS to printed circuit board module for loose connections and damage. Replace as required (WP 0057, Remove/Install Current Transformers).
- STEP 12. If symptom continues, test contactor for proper operation, and replace as required (WP 0052, Remove/Install Contactor).
- STEP 13. If symptom continues, check DCS LEDs, and replace DCS as required (WP 0018, Repair DCS and WP 0017, Remove/Install DCS).

SYMPTOM

[Fault 1918: Fuel Level Low] displayed on DCS screen.

NOTE

[Fault 1918: Fuel Level Low] indicates that there are approximately 4 min left (1% of fuel supply left) until the generator set will be out of fuel.

MALFUNCTION

Low fuel level or fuel level sensor malfunction.

CORRECTIVE ACTION

- STEP 1. Verify generator set fuel level and refill as required (WP 0039, Service Fuel System).

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 2. If symptom continues, proceed to [Warning 2936: Fuel Level Sensor High] displayed on DCS screen symptom.

SYMPTOM

[Fault 2335: Excitation Fault] displayed on DCS screen.

MALFUNCTION

Circuit breaker, wiring, or AC generator malfunction.

CORRECTIVE ACTION

- STEP 1. Check circuit breakers to ensure they are installed securely in relay panel (WP 0061, Remove/Install Relay Panel).
- STEP 2. If symptom continues, check circuit breaker CB10 ALT QUAD 1 and CB11 ALT QUAD 2 to see if tripped, and reset as required (WP 0061, Remove/Install Relay Panel).
- STEP 3. Attempt restart (TM 9-6115-749-10).
- STEP 4. If restart fails or circuit breaker trips again, proceed to Step 5.

WARNING

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

WARNING

High voltage power is available when the main contactor is closed. Avoid accidental contact with live components. Ensure load cables are properly connected and the load cable door is shut before closing main contactor. Ensure that personnel working with/on loads connected to the generator set are aware that main contactor is about to be closed before closing main contactor. Failure to comply may cause injury or death to personnel.

NOTE

Wires P1-A, P1-R, and P1-C run from DCS P1 through P500 which plugs into J500 on printed circuit board module. Wires P501-9, P501-5, and P501-11 run from J501 to P501 to contactor terminals A1 through C1 to sense generator set voltage.

- STEP 5. Use wiring diagrams (Foldout Pages) to locate and inspect wires from contactor (K1) to printed circuit board module J501 for damage, moisture, bent pins or connectors, or improper connections.
- STEP 6. Repair or replace wiring or connectors as required (WP 0093, General Maintenance).

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 7. Use wiring diagrams (Foldout Pages) to locate and inspect wires P1-A, P1-R, and P1-C running from P500 and J500 on printed circuit board module to J1 and P1 of DCS for damage, moisture, bent pins or connectors, or improper connections.
- STEP 8. Repair or replace wiring or connectors as required (WP 0093, General Maintenance).
- STEP 9. If symptom continues, ensure battery ground cable is removed (WP 0036, Remove/Install Batteries), remove connectors, and check all wires inspected in Step 5 and Step 7 for shorts or opens using a multimeter set to test continuity WP 0093, General Maintenance).
- STEP 10. Repair or replace wiring as required and install connectors (WP 0059, Remove/Install Engine Wiring Harness and WP 0093, General Maintenance).

NOTE

Wires P1-J and P1-K run to connector P90 from DCS (P1) to excite the AC alternator field. Wires P85-1 and P85-2 (quad circuit wires to sense AC generator voltage) run from the relay panel through plug P5D to the quad in the AC generator. Wires P1-L and P1-M run to P5D from the DCS (P1).

- STEP 11. If circuit breaker trips again, use wiring diagrams (Foldout Pages) to locate and check wires running from AC generator to plug P90 and to plug P85 for damage, moisture, bent pins or connectors, or improper connection.
- STEP 12. Repair or replace wiring or connectors as required (WP 0059, Remove/Install Engine Wiring Harness and WP 0093, General Maintenance).
- STEP 13. If symptom continues, ensure battery ground cable is removed (WP 0036, Remove/Install Batteries), remove wiring connector, and test wires running from P85 to P5D (wires P85-1 and P85-2) at relay panel (Foldout Pages) for shorts or opens using a multimeter set to test continuity (WP 0093, General Maintenance).
- STEP 14. Repair or replace wiring as required, and install connector (WP 0059, Remove/Install Engine Wiring Harness and WP 0093, General Maintenance).
- STEP 15. Inspect P5D pins (A, B, G and H) and connector at relay panel (Foldout Pages) for damage to pins, poor connections, and moisture.
- STEP 16. Replace or repair wiring as required (WP 0059, Remove/Install Engine Wiring Harness and WP 0093, General Maintenance).
- STEP 17. If symptom continues, ensure battery ground cable is removed (WP 0036, Remove/Install Batteries), and remove connector to test wires running from P5D to DCS P1 (wires P1-L and P1-M) at relay panel (Foldout Pages) for shorts or opens using a multimeter set to test continuity WP 0093, General Maintenance).
- STEP 18. Repair or replace wiring as required and install connector (WP 0059, Remove/Install Engine Wiring Harness and WP 0093, General Maintenance).
- STEP 19. Inspect P1 and J1 at DCS (Foldout Pages) for damage to pins, poor connections, and moisture.
- STEP 20. Repair or replace wiring or connectors as required (WP 0059, Remove/Install Engine Wiring Harness and WP 0093, General Maintenance).
- STEP 21. If symptom continues, test AC generator (WP 0051, Test AC Generator), and replace as required (WP 0049, Remove/Install 50/60 Hz AC Generator Assembly or WP 0050, Remove/Install 400 Hz AC Generator Assembly).
- STEP 22. If symptom continues, troubleshoot engine for poor performance (WP 0011, Engine System Troubleshooting without a DCS Code).

TROUBLESHOOTING PROCEDURES – CONTINUED

STEP 23. If symptom continues, check DCS LEDs for proper function (DS1100 for proper AVR function), and replace DCS as required (WP 0018, Repair DCS and WP 0017, Remove/Install DCS).

STEP 24. If symptom continues, replace AC generator (WP 0049, Remove/Install 50/60 Hz AC Generator Assembly or WP 0050, Remove/Install 400 Hz AC Generator Assembly).

SYMPTOM

[Fault 2914: Genset AC Meter Failed] displayed on DCS screen.

MALFUNCTION

Generator set AC meter failure.

CORRECTIVE ACTION

Check DCS LEDs and replace DCS as required or if symptom continues (WP 0018, Repair DCS and WP 0017, Remove/Install DCS).

SYMPTOM

[Fault 2972: Field Overload] displayed on DCS screen.

MALFUNCTION

Faulty AC generator components or AVR.

CORRECTIVE ACTION

Troubleshoot IAW [Fault 2335: Excitation Fault] displayed on DCS screen symptom.

SYMPTOM

[Fault 3664: Invalid Genset Configuration] displayed on DCS screen.

MALFUNCTION

Incorrect dip switch settings, wiring malfunction, or improper engine or AC generator combination.

CORRECTIVE ACTION**WARNING**

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

WARNING

High voltage power is available when the main contactor is closed. Avoid accidental contact with live components. Ensure load cables are properly connected and the load cable door is shut before closing main contactor.

TROUBLESHOOTING PROCEDURES – CONTINUED

Ensure that personnel working with/on loads connected to the generator set are aware that main contactor is about to be closed before closing main contactor. Failure to comply may cause injury or death to personnel.

- STEP 1. Check position of dip switches against settings recorded during removal or replacement to see if there is an incorrect setting (WP 0058, Remove/Install Printed Circuit Board Module).
- STEP 2. Check dip switch settings against data in WP 0058, Remove/Install Printed Circuit Board Module.
- STEP 3. Move dip switch(es) to correct setting as required (WP 0058, Remove/Install Printed Circuit Board Module).

NOTE

Wires P3-m, P3-n, P3-s, P3-GG, P3-LL, and P3-MM are for dip switch settings. They are pins or sleeves 20, 28, 38, 39, 40, and 50 on P3, J3, P500, and J500.

- STEP 4. If symptom continues, use wiring diagrams (Foldout Pages) to find and inspect wires, pins, sleeves, and connectors on DCS P3 and plug P500 to J500 on printed circuit board module for damage to pins or sleeves, poor connections, and moisture.
- STEP 5. Replace or repair any wires, connectors, or pins as required (WP 0059, Remove/Install Engine Wiring Harness and WP 0093, General Maintenance).
- STEP 6. If symptom continues, ensure battery ground cable is disconnected (WP 0036, Remove/Install Batteries), remove connectors, and use wiring diagrams (Foldout Pages) to check wiring inspected in Step 4 for shorts and opens using a multimeter set to test continuity (WP 0093, General Maintenance).
- STEP 7. Replace or repair any wires, connectors, or pins as required, and install connectors (WP 0059, Remove/Install Engine Wiring Harness and WP 0093, General Maintenance).
- STEP 8. If symptom continues, check DCS LEDs and replace DCS as required (WP 0018, Repair DCS and WP 0017, Remove/Install DCS).
- STEP 9. If symptom continues, replace printed circuit board module (WP 0058, Remove/Install Printed Circuit Board Module).

SYMPTOM

[Fault 3665: Invalid Voltage Configuration] displayed on DCS screen.

NOTE

[Fault 3665: Invalid Voltage Configuration] appears on DCS screen if an invalid voltage selection switch or some other fault or invalid selection occurs when generator set is not running.

MALFUNCTION

Voltage selection fault.

TROUBLESHOOTING PROCEDURES – CONTINUED**CORRECTIVE ACTION****WARNING**

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

- STEP 1. Examine the position of the voltage selection switch to determine that it is at desired voltage configuration and fasteners are to correct torque (WP 0054, Remove/Install Voltage Selection Switch).
- STEP 2. Move switch handle to the desired voltage position and tighten as required (WP 0054, Remove/Install Voltage Selection Switch and TM 9-6115-749-10).
- STEP 3. If symptom continues, use wiring diagrams (Foldout Pages) to confirm voltage selection switch is wired correctly.
- STEP 4. Adjust wiring as required (WP 0054, Remove/Install Voltage Selection Switch).
- STEP 5. If symptom continues, check connections and wiring from plug P503 to AUX CONTACT connector on printed circuit board module for damage to pins or sleeves, poor connections, or moisture.
- STEP 6. Repair or replace as required (WP 0058, Remove/Install Printed Circuit Board Module and WP 0093, General Maintenance).
- STEP 7. If symptom continues, ensure battery ground cable is disconnected (WP 0036, Remove/Install Batteries), remove wires as required, and test wires P503-1, P503-2, P503-3, and P503-4 running to voltage selection switch terminals 81, 82, 83, and 84 (S501-AUX) using wiring diagrams (Foldout Pages) and a multimeter set to test continuity (WP 0093 General Maintenance).
- STEP 8. Repair or replace wiring as required and install wires (WP 0054, Remove/Install Voltage Selection Switch and WP 0093, General Maintenance).
- STEP 9. If symptom continues, replace voltage selection switch (WP 0054, Remove/Install Voltage Selection Switch).
- STEP 10. If symptom continues, check DCS LEDs, and replace DCS as required (WP 0018, Repair DCS and WP 0017, Remove/Install DCS).

SYMPTOM

[Fault 3668: Output Voltage Configuration Bit 0 Changed] or [Fault 3669: Output Voltage Configuration Bit 1 Changed] displayed on DCS screen.

NOTE

[Fault 3668: Output Voltage Configuration Bit 0 Changed] or [Fault 3669: Output Voltage Configuration Bit 1 Changed] appears on DCS screen when a change occurs while generator set is running (e.g. voltage selection switch change or wire vibrating loose).

MALFUNCTION

Voltage selection fault.

TROUBLESHOOTING PROCEDURES – CONTINUED**CORRECTIVE ACTION**

Troubleshoot IAW [Fault 3665: Invalid Voltage Configuration] displayed on DCS screen symptom.

SYMPTOM

[Fault 3673: Convenience Receptacle AC Meter Failed] displayed on DCS screen.

MALFUNCTION

Convenience receptacle AC meter failed.

CORRECTIVE ACTION

Check DCS LEDs and replace DCS as required or if symptom continues WP 0018, Repair DCS and WP 0017, Remove/Install DCS).

SYMPTOM

[Fault 3677: Genset Config Factory Test Fault] displayed on DCS screen.

MALFUNCTION

Factory calibration error.

CORRECTIVE ACTION

Replace DCS WP 0017, Remove/Install DCS).

SYMPTOM

[Warning 135: Oil Pressure Sensor High] displayed on DCS screen.

MALFUNCTION

Voltage above normal or shorted to a high source.

CORRECTIVE ACTION**WARNING**

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

- STEP 1. Check wiring connections to ensure that they are seated securely into connection ends at oil pressure sender and DCS. Reseat wiring connections into connection ends as required (WP 0017, Remove/Install DCS and WP 0063, Test Engine Oil Pressure).
- STEP 2. If symptom continues, inspect wiring connections at oil pressure sensor and DCS for damage to pins or wires.

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 3. If damage to pins or wires is found, repair or replace as required (WP 0017, Remove/Install DCS, WP 0063, Test Engine Oil Pressure; and WP 0093, General Maintenance).

NOTE

Measure resistance of oil pressure sender from pin B (supply voltage) to pin C (signal) of oil pressure sender.

- STEP 4. If symptom continues, remove wire connector (WP 0063, Test Engine Oil Pressure) and test oil pressure sender for correct resistance using a multimeter set to test ohms (WP 0093, General Maintenance).
- STEP 5. Replace oil pressure sender if value is more than 100 k Ω or approximately 0 Ω , and install wire connector (WP 0063, Test Engine Oil Pressure).

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Do not ground yourself in standing water. Failure to comply may cause injury or death to personnel and damage to equipment.

NOTE

The DCS connector (P3) wires run directly to the oil pressure sender (MT40). P3-f supplies 5VDC to the oil pressure sender, P3-g is the signal wire, and P3-k is the return. All wires enter the oil pressure sender through P40 (pins A, B, and C).

- STEP 6. If symptom continues, turn engine control switch to PRIME & RUN (TM 9-6115-749-10), remove wiring connector (WP 0063, Test Engine Oil Pressure), and test supply voltage to oil pressure sender using a multimeter set to test VDC (WP 0093, General Maintenance).
- STEP 7. If supply voltage is within 4.75 to 5.25 VDC range, proceed to Step 11.
- STEP 8. If supply voltage is not within 4.75 to 5.25 VDC range, turn engine control switch to OFF, ensure battery ground cable is disconnected (WP 0036, Remove/Install Batteries), and check engine wiring harness for shorts and opens using a multimeter set to test continuity (WP 0093, General Maintenance and TM 9-6115-749-10).
- STEP 9. Repair or replace engine wiring harness as required and install connector (WP 0059, Remove/Install Engine Wiring Harness and WP 0093, General Maintenance).
- STEP 10. If symptom continues, replace engine wiring harness (WP 0059, Remove/Install Engine Wiring Harness and WP 0093, General Maintenance).
- STEP 11. If symptom continues, turn engine control switch to OFF, if not already in OFF position, ensure battery ground cable is disconnected (WP 0036, Remove/Install Batteries), and use a multimeter set to test continuity to check signal wire P3-g for opens or shorts (WP 0093, General Maintenance and TM 9-6115-749-10).
- STEP 12. Repair or replace wiring as required and install connector (WP 0059, Remove/Install Engine Wiring Harness and WP 0093, General Maintenance).
- STEP 13. If symptom continues, replace oil pressure sender if not already replaced as a result of Step 5 (WP 0063, Test Engine Oil Pressure).

TROUBLESHOOTING PROCEDURES – CONTINUED

STEP 14. If symptom continues, check DCS LEDs and replace DCS as required (WP 0018, Repair DCS and WP 0017, Remove/Install DCS).

SYMPTOM

[Warning 141: Oil Pressure Sensor Low] displayed on DCS screen.

MALFUNCTION

Voltage below normal or shorted to a low source.

CORRECTIVE ACTION**NOTE**

The troubleshooting procedures for DCS code 141 are IAW DCS code 135. The difference between the two codes is the type of short or open, resulting in low voltage for DCS code 141 or high voltage for DCS code 135.

Troubleshoot IAW [Warning 135: Oil Pressure Sensor High] displayed on DCS screen symptom.

SYMPTOM

[Warning 144: Coolant Temp Sensor OOR High] displayed on DCS screen.

NOTE

OOR means "Out Of Range." [Warning 144: Coolant Temp Sensor OOR High] displayed on DCS screen indicates high signal voltage and/or a short to a high source. [Warning 145: Coolant Temp Sensor OOR Low] displayed on DCS screen indicates low signal voltage and/or a short to a low source (ground/return ground). A shorted return can cause multiple fault or warning codes to be active on the DCS screen.

MALFUNCTION

Defective temperature sensor, poor wiring connection, or a short.

CORRECTIVE ACTION

- STEP 1. Check wiring connections to ensure that they are seated securely into connection ends at engine wiring harness, temperature sensor, and DCS. Tighten wires into connection ends if necessary (WP 0072, Remove/Install Thermostat Housing,(WP 0017, Remove/Install DCS)(WP 0059, Remove/Install Engine Wiring Harness).
- STEP 2. If symptom continues, test temperature sensor and replace as required (WP 0072(WP 0059, Remove/Install Thermostat Housing, Remove/Install DCS).
- STEP 3. If symptom continues, inspect wiring connections at engine wiring harness, temperature sensor, and DCS for damage to pins or wires (WP 0072, Remove/Install Thermostat Housing,(WP 0017, Remove/Install DCS)(WP 0059, Remove/Install Engine Wiring Harness)..
- STEP 4. If damage to pins or wires is found, repair or replace as required ,(WP 0072, Remove/Install Thermostat Housing,(WP 0017, Remove/Install DCS)(WP 0059, Remove/Install Engine Wiring Harness).

TROUBLESHOOTING PROCEDURES – CONTINUED**WARNING**

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Do not ground yourself in standing water. Failure to comply may cause injury or death to personnel and damage to equipment.

NOTE

Connector P35 attaches to coolant temperature sensor (MT35). From P35 (pins A and B) the wires connect to the P3 plug (P3-h and P3-q) at the DCS.

- STEP 5. If symptom continues, turn engine control switch to PRIME & RUN without starting generator set (TM 9-6115-749-10).
- STEP 6. Remove wiring connector and test supply voltage to coolant temperature sensor using wiring diagrams and a multimeter set to test VDC (WP 0093, General Maintenance and Foldout Pages).
- STEP 7. If supply voltage is within 9.5 to 10.5 VDC range, proceed to Step 11.
- STEP 8. If supply voltage is not within 9.5 to 10.5 VDC range, turn engine control switch to OFF, ensure battery ground cable is disconnected (WP 0036, Remove/Install Batteries), and check engine wiring harness for shorts and opens using wiring diagrams and multimeter set to test continuity (WP 0093, General Maintenance, Foldout Pages, and TM 9-6115-749-10).
- STEP 9. Repair or replace wiring harness as required and install wiring connector (WP 0059, Remove/Install Engine Wiring Harness and WP 0093, General Maintenance).
- STEP 10. If symptoms continue, check DCS LEDs and replace DCS as required (WP 0018, Repair DCS and WP 0017, Remove/Install DCS).
- STEP 11. If symptom continues, turn engine control switch to OFF and replace coolant temperature sensor if not already replaced as a result of Step 2 (WP 0072, Remove/Install Thermostat Housing and TM 9-6115-749-10).
- STEP 12. If symptoms continue, check DCS LEDs and replace DCS as required (WP 0018, Repair DCS and WP 0017, Remove/Install DCS).

SYMPTOM

[Warning 145: Coolant Temp Sensor OOR Low] displayed on DCS screen.

MALFUNCTION

Voltage below normal or shorted to a low source.

CORRECTIVE ACTION

Troubleshoot IAW [Warning 144: Coolant Temp Sensor OOR High] displayed on DCS screen symptom.

SYMPTOM

[Warning 319: Real Time Clock Error] displayed on DCS screen.

TROUBLESHOOTING PROCEDURES – CONTINUED**MALFUNCTION**

Clock no longer accurate due to temporary power loss or backup battery failure.

CORRECTIVE ACTION

- STEP 1. Reset clock IAW TM 9-6115-749-10.
- STEP 2. If symptom continues, remove DCS control panel assembly (WP 0018, Repair DCS) to check for loose backup battery, and secure as required.
- STEP 3. If symptom continues, replace DCS (WP 0017, Remove/Install DCS).

SYMPTOM

[Warning 441: Low Battery Voltage] displayed on DCS screen.

MALFUNCTION

Battery or charging failure.

CORRECTIVE ACTION

Troubleshoot IAW [Warning 1442: Weak Battery] displayed on DCS screen symptom.

SYMPTOM

[Warning 442: High Battery Voltage] displayed on DCS screen.

MALFUNCTION

Alternator or DCS failure.

CORRECTIVE ACTION

- STEP 1. Test battery-charging alternator assembly and replace as required (WP 0075, Remove/Install Battery-Charging Alternator).
- STEP 2. If symptom continues, test DCS LEDs and replace DCS as required (WP 0018, Repair DCS and WP 0017, Remove/Install DCS).

SYMPTOM

[Warning 1131: Battle Short Active] displayed on DCS screen.

MALFUNCTION

BATTLESHORT switch malfunction.

CORRECTIVE ACTION

- STEP 1. Ensure BATTLESHORT switch is in OFF position (TM 9-6115-749-10).
- STEP 2. If BATTLESHORT is ON, determine reason for use and switch OFF as required (TM 9-6115-749-10).
- STEP 3. If symptom continues, test BATTLESHORT switch and replace as required (WP 0018, Repair DCS).

TROUBLESHOOTING PROCEDURES – CONTINUED

STEP 4. If symptom continues, replace DCS (WP 0017, Remove/Install DCS).

SYMPTOM

[Warning 1417: Power Down Failure] displayed on DCS screen.

MALFUNCTION

DCS malfunction.

CORRECTIVE ACTION

Check DCS LEDs and replace DCS as required (WP 0018, Repair DCS and WP 0017, Remove/Install DCS).

SYMPTOM

[Warning 1441: Low Fuel Level] displayed on DCS screen.

NOTE

[Fault 1441: Fuel Level Low] indicates that there is 5% of fuel supply left until the generator set will be out of fuel.

MALFUNCTION

Low fuel level or sensor malfunction.

CORRECTIVE ACTION

Troubleshoot IAW [Fault 1918: Fuel Level Low] displayed on DCS screen symptom.

SYMPTOM

[Warning 1442: Weak Battery] displayed on DCS screen.

NOTE

[Warning 1442: Weak Battery] displays when battery voltage is below 14.4 VDC.
[Warning 441: Low Battery Voltage] displays when battery voltage is below 21 VDC.

MALFUNCTION

Battery connections are loose or batteries are insufficiently charged.

CORRECTIVE ACTION**WARNING**

Do not damage batteries. Storage batteries are filled with a liquid acid that can leak from sealed battery when case is broken. Contact with acidic liquid can burn skin and eyes. Wear safety goggles and chemical gloves and avoid acid splash while handling damaged batteries. Do not move batteries by terminals. Failure to comply may cause injury or death to personnel or damage to equipment.

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 1. Check for corroded or loose battery connections. Clean/replace corroded battery connections and tighten loose battery connections as required (WP 0036, Remove/Install Batteries).
- STEP 2. If symptom continues, test batteries (WP 0036, Remove/Install Batteries).
- STEP 3. Charge batteries, start engine utilizing the NATO slave receptacle and an outside power source, or replace batteries as required (WP 0036, Remove/Install Batteries and WP 0093, General Maintenance).
- STEP 4. If symptom continues, proceed to next malfunction.

MALFUNCTION

Loose belt, defective battery-charging alternator, or defective electrical component.

CORRECTIVE ACTION

- STEP 1. Check for loose battery-charging alternator belt and adjust tension or replace as required (WP 0076, Remove/Install Battery-Charging Alternator Belt).
- STEP 2. Observe DCS [Battery] [Adc] indicator to ensure battery-charging alternator is charging batteries properly (TM 9-6115-749-10).
- STEP 3. Test battery-charging alternator if batteries are not charging properly and replace as required (WP 0075, Remove/Install Battery-Charging Alternator).
- STEP 4. If symptom continues, check DCS LEDs (WP 0018, Repair DCS) and replace as required WP 0017, Remove/Install DCS).

SYMPTOM

[Warning 1444: KW Overload] displayed on DCS screen.

MALFUNCTION

Load cable or wiring malfunction.

CORRECTIVE ACTION

Troubleshoot IAW [Fault 1445: Short Circuit] displayed on DCS screen symptom.

SYMPTOM

[Warning 1449: Overfrequency] displayed on DCS screen.

MALFUNCTION

Generator AC output frequency is high.

CORRECTIVE ACTION**WARNING**

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

TROUBLESHOOTING PROCEDURES – CONTINUED**WARNING**

High voltage power is available when the main contactor is closed. Avoid accidental contact with live components. Ensure load cables are properly connected and the load cable door is shut before closing main contactor. Ensure that personnel working with/on loads connected to the generator set are aware that main contactor is about to be closed before closing main contactor. Failure to comply may cause injury or death to personnel.

- STEP 1. Check for sudden reduction in load demands. Adjust governor gain as required (WP 0017, Remove/Install DCS).
- STEP 2. If symptom continues, ensure load cables are completely disconnected and check for shorts or opens in the load using a multimeter set to test continuity (WP 0093, General Maintenance).
- STEP 3. Repair or replace load components as required.
- STEP 4. If symptom continues, check frequency, voltage selection, and voltage settings on DCS (TM 9-6115-749-10).
- STEP 5. If incorrect, adjust settings as required (TM 9-6115-749-10).
- STEP 6. If symptom continues, troubleshoot IAW [Fault 115: Speed Signal Lost] displayed on DCS screen symptom.

SYMPTOM

[Warning 1451: Genset/Bus Voltage Mismatch] displayed on DCS screen.

MALFUNCTION

DCS fault.

CORRECTIVE ACTION**WARNING**

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Do not ground yourself in standing water. Failure to comply may cause injury or death to personnel and damage to equipment.

NOTE

[Warning 1451: Genset/Bus Voltage Mismatch] indicates a calibration error with the metering circuits on the DCS. The offset in the meters can be hand-calibrated using InPower AMMPS software.

If [Warning 1451: Genset/Bus Voltage Mismatch] is hardware and not calibration error related, there was an extreme voltage drop through the contactor and/or its connections. A damaged contactor, poor connections in the output box between the bus sense voltage and generator sense voltage, or a poor DCS harness connection could cause the warning.

- STEP 1. If operating in parallel, ensure all generator sets in parallel are shut down. If not operating in parallel proceed to Step 3.
- STEP 2. Check connections between generators and ensure voltage and frequency of generator sets are at the same settings (TM 9-6115-749-10).

TROUBLESHOOTING PROCEDURES – CONTINUED**NOTE**

Wires P1-A, P1-R, and P1-C run from DCS P1 through P500 which plugs into J500 on printed circuit board module. Wires P501-9, P501-5, and P501-11 run from J501 to P501 to contactor terminals A1 through C1 to sense generator set voltage.

- STEP 3. If symptom continues, check for loose voltage sense connections at DCS, printed circuit board module, and contactor (Foldout Pages). Tighten as required.
- STEP 4. If symptom continues, use wiring diagrams (Foldout Pages) to locate and inspect wires from contactor (K1) to printed circuit board module J501 for damage, moisture, bent pins or connectors, or improper connections.
- STEP 5. Repair or replace wiring or connectors as required (WP 0093, General Maintenance).
- STEP 6. If symptom continues, use wiring diagrams (Foldout Pages) to locate and inspect wires P1-A, P1-R, and P1-C running from P500 and J500 on printed circuit board module to J1 and P1 of DCS for damage, moisture, bent pins or connectors, or improper connections.
- STEP 7. Repair or replace wiring or connectors as required (WP 0093, General Maintenance).
- STEP 8. If symptom continues, ensure battery ground cable is removed (WP 0036, Remove/Install Batteries), remove wires as required, and check all wires inspected in Step 4 and Step 6 for shorts or opens using a multimeter set to test continuity (WP 0093, General Maintenance).
- STEP 9. Repair or replace wiring as required and install wires (WP 0059, Remove/Install Engine Wiring Harness and WP 0093, General Maintenance).
- STEP 10. If symptom continues, test contactor and replace as required (WP 0052, Remove/Install Contactor).
- STEP 11. If symptom continues, recalibrate DCS using InPower AMMPS software (WP 0093, General Maintenance).
- STEP 12. If symptom continues, check DCS LEDs and replace DCS as required (WP 0018, Repair DCS and WP 0017, Remove/Install DCS).

SYMPTOM

[Warning 1469: Speed/Hz Mismatch] displayed on DCS screen.

MALFUNCTION

Speed sensor error or flywheel damage.

CORRECTIVE ACTION

- STEP 1. Inspect flywheel for missing teeth or other damage (WP 0085, Remove/Install Flywheel).
- STEP 2. Replace as required (WP 0085, Remove/Install Flywheel).
- STEP 3. If symptom continues or flywheel is not damaged, troubleshoot IAW [Fault 115: Speed Signal Lost] displayed on DCS screen symptom.

TROUBLESHOOTING PROCEDURES – CONTINUED**SYMPTOM**

[Warning 1471: High Current Warning] displayed on DCS screen.

MALFUNCTION

Short, overload, or AC generator malfunction.

CORRECTIVE ACTION

Troubleshoot IAW [Fault 1472: High Current] displayed on DCS screen symptom.

SYMPTOM

[Warning 1689: Reset Real Time Clock] displayed on DCS screen.

MALFUNCTION

Clock no longer accurate due to temporary power loss or backup battery failure.

CORRECTIVE ACTION

STEP 1. Reset clock IAW TM 9-6115-749-10.

STEP 2. If symptom continues, replace DCS (WP 0017, Remove/Install DCS).

SYMPTOM

[Warning 2336: Checksum Fault] displayed on DCS screen.

MALFUNCTION

Calibration file error.

CORRECTIVE ACTION**NOTE**

[Warning 2336: Checksum Fault] only occurs while installing a calibration file. DCS code may display during process or at end of process.

STEP 1. Attempt to reinstall the calibration file IAW Recovering AMMPS DCS if Initial Calibration Fails task (WP 0093, General Maintenance).

STEP 2. If symptom continues, replace DCS (WP 0017, Remove/Install DCS).

SYMPTOM

[Warning 2915: Genset Bus AC Meter Failed] displayed on DCS screen.

MALFUNCTION

Generator set Bus AC meter failed.

CORRECTIVE ACTION**NOTE**

Failure of bus AC meter will disable paralleling functions for a generator set.

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 1. Press FAULT RESET to attempt to clear fault (TM 9-6115-749-10).
- STEP 2. If symptom continues, replace DCS (WP 0017, Remove/Install DCS).

SYMPTOM

[Warning 2917: Genset Bus Voltage High] displayed on DCS screen.

MALFUNCTION

Paralleling or voltage sense fault.

CORRECTIVE ACTION**WARNING**

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

- STEP 1. If operating in parallel, check connections between generators, and ensure voltage and frequency of both generator sets are at the same settings (TM 9-6115-749-10).
- STEP 2. If symptom continues, troubleshoot IAW [Fault 2335: Excitation Fault] displayed on DCS screen symptom.

SYMPTOM

[Warning 2936: Fuel Level Sensor High] displayed on DCS screen.

MALFUNCTION

Fuel level sensor malfunction.

CORRECTIVE ACTION**WARNING**

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Do not ground yourself in standing water. Failure to comply may cause injury or death to personnel and damage to equipment.

NOTE

The fuel level sensor contains three wires that run to connector P70: P70- A (12 VDC supply), P70-B (signal wire, 0.25 VDC empty tank to 4.75 VDC full tank range), and P70-C (return).. All wires run to DCS through P3 connector (P3-F, P3-G, and P3-j).

- STEP 1. Ensure connections are installed securely at fuel level sensor and DCS (WP 0045, Remove/Install Fuel Level Sensor and WP 0017, Remove/Install DCS).
- STEP 2. If symptom continues, remove connector from fuel level sensor, turn engine control switch to PRIME & RUN (TM 9-6115-749-10), and use a multimeter set to test VDC (WP 0093, General Maintenance) to check P70-A and P70-C for voltage at P70 connector (Foldout Pages).

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 3. If value is outside of 12 VDC range $\pm 10\%$, proceed to Step 5.
- STEP 4. If value is within 12 VDC range $\pm 10\%$, proceed to Step 8.
- STEP 5. Turn engine control switch to OFF (TM 9-6115-749-10), ensure battery ground cable is disconnected (WP 0036, Remove/Install Batteries), and use a multimeter set to continuity to test wiring (wires P3-F, P3-G, and P3-j) from fuel level sensor unit wiring harness connector to DCS for opens and shorts (WP 0093, General Maintenance).
- STEP 6. Repair or replace wiring as required and install connector (WP 0059, Remove/Install Engine Wiring Harness and WP 0093, General Maintenance).
- STEP 7. If symptom continues, check DCS LEDs and replace DCS as required (WP 0018, Repair DCS and WP 0017, Remove/Install DCS).
- STEP 8. Turn engine control switch to OFF and test fuel level sensor (MT70) RED wire (A) and BLACK wire (C) using a multimeter set to test ohms (WP 0093, General Maintenance and TM 9-6115-749-10).
- STEP 9. Replace fuel level sensor if ohms reading stays at zero or shows infinite reading indicating an open. Install connector as required (WP 0045, Remove/Install Fuel Level Sensor).
- STEP 10. If symptom continues, ensure battery ground cable is disconnected (WP 0036, Remove/Install Batteries), remove connector, and test wire pin c from P70 to DCS P3-j for opens or shorts using a multimeter set to test continuity (WP 0093, General Maintenance).
- STEP 11. Repair or replace wiring harness as required and install connector (WP 0059, Remove/Install Engine Wiring Harness).
- STEP 12. If symptom continues and fuel level sensor has not been replaced, replace fuel level sensor (WP 0045, Remove/Install Fuel Level Sensor).
- STEP 13. If symptom continues, check DCS LEDs and replace DCS as required (WP 0018, Repair DCS and WP 0017, Remove/Install DCS).

SYMPTOM

[Warning 2937: Fuel Level Sensor Low] displayed on DCS screen.

MALFUNCTION

Fuel level sensor malfunction.

CORRECTIVE ACTION

Troubleshoot IAW [Warning 2936: Fuel Level Sensor High] displayed on DCS screen symptom.

SYMPTOM

[Warning 2967: Governor Fault] displayed on DCS screen.

MALFUNCTION

Governor actuator malfunction.

TROUBLESHOOTING PROCEDURES – CONTINUED**CORRECTIVE ACTION****WARNING**

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Do not ground yourself in standing water. Failure to comply may cause injury or death to personnel and damage to equipment.

- STEP 1. Inspect wiring connectors and wiring running to governor actuator on fuel injection pump (WP00071) Remove Install Fuel Injection Pump for loose connections, loose, damaged, or missing pins, and damaged wiring.
- STEP 2. Replace or repair wiring as required (WP 0093, General Maintenance and WP 0059, Remove/Install Engine Wiring Harness).

NOTE

The governor actuator resistance specification of $19.9 \Omega \pm 5\%$ is for room temperature (68 °F (20 °C)). The resistance increases about 0.22% per degree Fahrenheit (0.12% per degree Celsius) above room temperature. It will decrease at the same rate below 68 °F (20 °C). The governor actuator will generally fail by way of an open circuit, coil short to actuator housing, or a resistance decrease due to a partial failure. Partial failure typically causes rapid failure (short circuit) once it begins.

- STEP 3. If symptom continues, remove wiring connector from governor actuator and test pins on governor actuator for resistance (WP 0071, Remove/Install Fuel Injection Pump and WP 0093, General Maintenance).
- STEP 4. Replace governor actuator if resistance is outside of specification or proceed to Step 5 if within specification (WP 0071, Remove/Install Fuel Injection Pump).

NOTE

Wires P2-J and P2-M run from DCS to P37 at governor actuator.

- STEP 5. Ensure battery ground cable is disconnected (WP 0036, Remove/Install Batteries) and test wiring from governor actuator to DCS (Foldout Pages) for shorts or opens using a multimeter set to test continuity (WP 0093, General Maintenance).
- STEP 6. Repair or replace wiring as required and install connector (WP 0093 and WP 0059, Remove/Install Engine Wiring Harness).
- STEP 7. If symptom continues, test DCS LEDs and replace DCS as required (WP 0018, Repair DCS and WP 0017, Remove/Install DCS).

SYMPTOM

[Warning 2968: AVR Fault] displayed on DCS screen.

MALFUNCTION

Wiring or AC generator failure.

CORRECTIVE ACTION

Troubleshoot IAW [Fault 2335: Excitation Fault] displayed on DCS screen symptom.

TROUBLESHOOTING PROCEDURES – CONTINUED**SYMPTOM**

[Warning 3662: Battery Discharge] displayed on DCS screen.

MALFUNCTION

Loose belt, defective battery-charging alternator, or defective electrical component.

CORRECTIVE ACTION

- STEP 1. Check for loose battery-charging alternator belt and adjust tension or replace as required (WP 0076, Remove/Install Battery-Charging Alternator Belt).
- STEP 2. If battery-charging alternator belt is not loose, test battery-charging alternator and replace as required (WP 0075, Remove/Install Battery-Charging Alternator).
- STEP 3. If symptom continues, check wiring connections to ensure that they are seated securely into connection ends at battery current sensor and DCS. Reseat wiring connections into connection ends as required (WP 0059, Remove/Install Engine Wiring Harness).
- STEP 4. If symptom continues, inspect wiring connections at battery current sensor and DCS for damage to pins or wires.
- STEP 5. If damage to pins or wires is found, repair or replace as required (WP 0059, Remove/Install Engine Wiring Harness and WP 0093, General Maintenance).

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Do not ground yourself in standing water. Failure to comply may cause injury or death to personnel and damage to equipment.

NOTE

Wires P3-E, P3-r, and P3-J run from DCS to connector P5 at battery current sensor. P3-E supplies 5 VDC to battery current sensor, P3-r is the return, and P3-J is the signal wire.

- STEP 6. If symptom continues, turn engine control switch to PRIME & RUN, remove connector, and use a multimeter set to test VDC to check connector P5 at battery current sensor for 4.75 to 5.25 VDC from P3-E to P3-r (WP 0093, General Maintenance and TM 9-6115-749-10).
- STEP 7. If voltage is within range, proceed to Step 9.
- STEP 8. If voltage is not within range, proceed to Step 12.
- STEP 9. Turn engine control switch to OFF, ensure battery ground cable is disconnected (WP 0036, Remove/Install Batteries) and use wiring diagrams (Foldout Pages) to check signal wire (P3-J) from battery current sensor to DCS for shorts or opens using a multimeter set to test continuity (WP 0093, General Maintenance).
- STEP 10. Repair or replace wiring as required and install connector (WP 0059, Remove/Install Engine Wiring Harness and WP 0093, General Maintenance).
- STEP 11. If symptom continues, replace battery current sensor as required.

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 12. Turn engine control switch to OFF, ensure battery ground cable is disconnected (WP 0036, Remove/Install Batteries) and use wiring diagrams (Foldout Pages) to check wiring from battery current sensor to DCS for shorts or opens using a multi-meter set to test continuity (WP 0093, General Maintenance).
- STEP 13. Repair or replace wiring as required and install connector (WP 0059, Remove/Install Engine Wiring Harness and WP 0093, General Maintenance).
- STEP 14. If symptom continues, check DCS LEDs and replace as required (WP 0018, Repair DCS and WP 0017, Remove/Install DCS).

SYMPTOM

[Warning 3666: Master Control Switch Configuration] displayed on DCS screen.

MALFUNCTION

Engine control switch fault.

CORRECTIVE ACTION

- STEP 1. Rotate engine control switch and confirm that engine control switch is not between two positions.
- STEP 2. Confirm proper installation of engine control switch and check for loose or damaged wires (WP 0018, Repair DCS). Repair or replace as required (WP 0018, Repair DCS).
- STEP 3. If symptom continues, test engine control switch and replace as required (WP 0018, Repair DCS).
- STEP 4. If symptom continues, replace DCS (WP 0017, Remove/Install DCS).

SYMPTOM

[Warning 3672: Automatic Field Flash Not Complete] displayed on DCS screen.

MALFUNCTION

Wiring or DCS malfunction.

CORRECTIVE ACTION**NOTE**

DCS wires P1-J and P1-K run from DCS P1 to connector P90 to flash the AC alternator field.

- STEP 1. Use wiring diagrams (Foldout Pages) to locate and check wires running from AC generator to plug P90 to DCS J1 for damage, moisture, bent pins or connectors, or improper connection.
- STEP 2. Repair or replace as required (WP 0059, Remove/Install Engine Wiring Harness and WP 0093, General Maintenance).
- STEP 3. If symptom continues, ensure battery ground cable is disconnected (WP 0036, Remove/Install Batteries), remove connector (WP 0059, Remove/Install Engine Wiring Harness), and test wires P1-J and P1-K to pins J and K in DCS P1 (Foldout Pages) for opens or shorts using a multimeter set to test continuity (WP 0093, General Maintenance).

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 4. Repair or replace wiring as required and install connector (WP 0059, Remove/Install Engine Wiring Harness and WP 0093, General Maintenance).
- STEP 5. If symptom continues, test AC generator (WP 0051, Test AC Generator) and replace as required (WP 0049, Remove/Install 50/60 Hz AC Generator Assembly or WP 0050, Remove/Install 400 Hz AC Generator Assembly).
- STEP 6. If symptom continues, check DCS LEDs and replace DCS as required (WP 0018, Repair DCS and WP 0017, Remove/Install DCS).

SYMPTOM

[Warning 3674: Genset Configuration Change] displayed on DCS screen.

NOTE

[Warning 3674: Genset Configuration Change] displays on DCS screen when the control cards of the DCS recognize the configuration has changed. This warning is most likely when a DCS is moved from one size generator set to a different size generator set. FAULT RESET can be selected and normal use of the generator set can continue. If the symptom continues, then troubleshooting procedures will need to be followed.

MALFUNCTION

Incorrect dip switch settings, wiring malfunction, or improper engine or AC generator combination.

CORRECTIVE ACTION

Troubleshoot IAW [Fault 3664: Invalid Genset Configuration] displayed on DCS screen symptom.

END OF WORK PACKAGE

FIELD MAINTENANCE

ELECTRICAL SYSTEM TROUBLESHOOTING WITHOUT A DCS CODE

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Personnel Required

91D (1)
Assistant (1)

References

TM 9-6115-749-10
WP 0008, Electrical System Troubleshooting with a DCS Code
WP 0016, Field PMCS, Including Lubrication Instructions
WP 0017, Remove/Install DCS
WP 0018, Repair DCS

References - cont'd

WP 0036, Remove/Install Batteries
WP 0037, Remove/Install Main DC Circuit Breaker
WP 0055, Remove/Install Hour Meter
WP 0056, Remove/Install Convenience Receptacle
WP 0058, Remove/Install Printed Circuit Board Module
WP 0059, Remove/Install Engine Wiring Harness
WP 0060, Remove/Install Power Wiring Harness
WP 0061, Remove/Install Relay Panel
WP 0068, Remove/Install Glow Plugs
WP 0075, Remove/Install Battery-Charging Alternator Assembly
WP 0093, General Maintenance
Foldout Pages

TROUBLESHOOTING PROCEDURE(S)**ELECTRICAL SYSTEM TROUBLESHOOTING WITHOUT A DCS CODE****WARNING**

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

WARNING

High voltage is produced when generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Do not ground yourself in standing water. Never attempt to connect or disconnect load cables while the generator sets are running. Failure to comply may cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Do not ground yourself in standing water. Failure to comply may cause injury or death to personnel and damage to equipment.

NOTE

Always perform PMCS prior to beginning any troubleshooting procedure (WP 0016, Field PMCS, Including Lubrication Instructions).

Read the entire corrective action sequence before beginning steps to complete corrective action for a malfunction.

TROUBLESHOOTING PROCEDURES – CONTINUED**SYMPTOM**

DCS indicates no power available and no lighted display.

MALFUNCTION

Battery malfunction.

CORRECTIVE ACTION**WARNING**

Batteries give off combustible gas. Do not smoke or use open flame when performing maintenance. Failure to comply may cause injury or death to personnel and damage to equipment.

WARNING

Battery acid can cause burns to skin and cause eye injury. Wear safety goggles and chemical gloves and avoid acid splash while working on the batteries. Failure to comply may cause injury or death to personnel.

WARNING

Do not damage batteries. Storage batteries are filled with a liquid acid that can leak from sealed battery when case is broken. Contact with acidic liquid can burn skin and eyes. Wear safety goggles and chemical gloves and avoid acid splash while handling damaged batteries. Do not move batteries by terminals. Failure to comply may cause injury or death to personnel or damage to equipment.

- STEP 1. If main DC circuit breaker is in OFF/TRIP position, move switch handle to RESET → ON position to reset circuit breaker.
- STEP 2. If main DC circuit breaker remains in the RESET → ON position and DCS illuminates, resume operation.
- STEP 3. If main DC circuit breaker continues to trip, proceed to next malfunction.
- STEP 4. If main DC circuit breaker remains in the RESET → ON position and DCS still has no lighted display, proceed to Step 5.
- STEP 5. Use DEAD CRANK SWITCH to see if batteries turn engine over (TM 9-6115-749-10).
- STEP 6. If engine turns over, proceed to Defective DCS malfunction.
- STEP 7. If engine does not turn over, continue to Step 8.
- STEP 8. Examine battery posts, cables, and connectors for looseness, corrosion, or other damage.
- STEP 9. Clean and tighten corroded and loose connectors and replace any connecting cables that show signs of damage.
- STEP 10. If symptom continues, completely disconnect the batteries from battery cables (WP 0036, Remove/Install Batteries).
- STEP 11. Test batteries and jump-start, charge, or replace as required (WP 0036, Remove/Install Batteries and WP 0093, General Maintenance).
- STEP 12. If symptom continues, proceed to next malfunction.

TROUBLESHOOTING PROCEDURES – CONTINUED**MALFUNCTION**

Circuit breaker or wiring malfunction.

CORRECTIVE ACTION**WARNING**

High voltage power is available when the main contactor is closed. Avoid accidental contact with live components. Ensure load cables are properly connected and the load cable door is shut before closing main contactor. Ensure that personnel working with/on loads connected to the generator set are aware that main contactor is about to be closed before closing main contactor. Failure to comply may cause injury or death to personnel.

- STEP 1. Check circuit breakers in relay panel (RP201) to see if tripped (WP 0061, Remove/Install Relay Panel).
- STEP 2. Reset circuit breaker(s) if tripped and check for signs of damage such as excessive heat or burned insulation (WP 0061, Remove/Install Relay Panel).
- STEP 3. If heat or insulation damage is found, replace circuit breaker or relay and proceed to Step 5 and follow troubleshooting to find failed component or location of short.
- STEP 4. If no signs of excessive heat or burned insulation are found but circuit breaker trips again, troubleshoot appropriate circuit using wiring diagrams and a multimeter set to test continuity (WP 0061, Remove/Install Relay Panel; WP 0093, General Maintenance; and Foldout Pages).
- STEP 5. If symptom continues, test main DC circuit breaker (WP 0037, Remove/Install Main DC Circuit Breaker). Replace as required.
- STEP 6. If main DC circuit breaker test shows main DC circuit breaker functioning properly, disconnect battery leads (WP 0036, Remove/Install Batteries) and proceed to Step 7.

WARNING

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

NOTE

If continuity is found between ground and load wire, a short circuit exists within Relay Panel 201 (RP201), battery-charging alternator, the glow plugs relay (K18), or the glow plug circuit to ground.

- STEP 7. Ensure battery ground cable is disconnected (WP 0036, Remove/Install Batteries) and use a multimeter selected to test continuity to check for shorts to ground in load wires from the main DC circuit breaker (Foldout Pages and WP 0093, General Maintenance).
- STEP 8. If short circuit is found, continue to Step 10.
- STEP 9. If no short circuit is found, proceed to next malfunction.

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 10. Disconnect load wires from load terminal of the main DC circuit breaker to separate for individual circuit analysis (WP 0061, Remove/Install Relay Panel and Foldout Pages).
- STEP 11. Test wires for shorts using a multimeter set to test continuity (WP 0093, General Maintenance).
- STEP 12. If short circuit is found, examine wiring and components within the isolated short circuit(s) visually to determine the wiring or component that is creating the short circuit.
- STEP 13. If visual examination reveals damaged wiring and/or components, repair and/or replace the damaged wiring (WP 0060, Remove/Install Power Wiring Harness) and/or components (WP 0061, Remove/Install Relay Panel; WP 0075, Remove/Install Battery- Charging Alternator; and WP 0068, Remove/Install Glow Plugs).
- STEP 14. If visual examination does not reveal damage caused by a short circuit, disconnect each component at the terminal wires and check for shorts to ground of each component using a multimeter set to test continuity (Foldout Pages and WP 0093, General Maintenance).
- STEP 15. Replace battery-charging alternator if continuity is found (WP 0075, Remove/Install Battery-Charging Alternator).
- STEP 16. If continuity is found in glow plug circuit, test glow plugs (WP 0068, Remove/Install Glow Plugs), and repair or replace as required (WP 0068, Remove/Install Glow Plugs).
- STEP 17. If continuity is found in RP201, determine whether the relay panel or a circuit or component powered from the relay panel is short circuited to ground using wiring diagrams and a multimeter set to test continuity (Foldout Pages and WP 0093, General Maintenance).
- STEP 18. Identify, isolate, and repair or replace plug connectors and/or components or wires that show evidence of a short circuit (WP 0059, Engine Wiring Harness and WP 0093, General Maintenance).
- STEP 19. If there are no visual damages or odor of burned insulation, open relay panel cover to examine internal components for signs of excessive heat and/or the odor of burned insulation.
- STEP 20. If the wiring and/or components subjected to short circuit have been identified by a tripped circuit breaker (Step 1 through 4), remove the tripped circuit breaker and use wiring diagrams to find the cause of the short circuit (Foldout Pages).
- STEP 21. Repair or replace wiring as required (WP 0059, Remove/Install Engine Wiring Harness and WP 0093, General Maintenance).
- STEP 22. If symptom continues, test relays (WP 0061, Remove/Install Relay Panel).
- STEP 23. Replace any relays and/or wiring that indicate short circuit until the cause of the short circuit has been eliminated (WP 0061, Remove/Install Relay Panel).
- STEP 24. If symptom continues, proceed to next malfunction.

MALFUNCTION

Defective DCS.

CORRECTIVE ACTION

- STEP 1. Check P1, P2, and P3 at DCS, and ensure they are connected and tight. Connect or tighten as required (WP 0017, Remove/Install DCS).

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 2. If symptom continues, check connections at relay control panel, and ensure they are tight and secure. Tighten or secure as required (WP 0061, Remove/Install Relay Panel).
- STEP 3. If symptom continues, check CB7 in relay control panel to make sure it is secure and has not been tripped. Secure or reset as required (WP 0061, Remove/Install Relay Panel).

WARNING

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

NOTE

Wires P2-A, P2-B, and P2-C provide battery power to the DCS.

- STEP 4. If breaker trips again, check wires P2-A, P2-B, and P2-C to DCS J2 and RP 201 P5D for proper connections, opens, or shorts using wiring diagrams (Foldout Pages) and a multimeter set to test continuity (WP 0093, General Maintenance).
- STEP 5. Repair or replace wires, and reset or replace CB7 as required (WP 0093, General Maintenance and WP 0061, Remove/Install Relay Panel).
- STEP 6. If symptom continues or breaker was not tripped in Step 3, check DCS LEDs, and replace DCS as required (WP 0018, Repair DCS and WP 0017, Remove/Install DCS).

SYMPTOM

EMERGENCY STOP pushbutton fails to stop generator set.

MALFUNCTION

EMERGENCY STOP pushbutton failure.

CORRECTIVE ACTION

- STEP 1. Push AC CIRCUIT INTERRUPT switch to place generator contactor in [CONTACTOR OPEN] position (TM 9-6115-749-10).

WARNING

While inspecting the operation of the generator set, do not inadvertently reach into the generator set. Failure to comply can cause injury or death to personnel.

WARNING

When operating, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow engine to cool before checks, services, and main-

TROUBLESHOOTING PROCEDURES – CONTINUED

tenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.

WARNING

Metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry and do not wear loose clothing when working on equipment. Failure to comply may cause injury or death to personnel.

WARNING

High voltage is produced when generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Do not ground yourself in standing water. Never attempt to connect or disconnect load cables while the generator sets are running. Failure to comply may cause injury or death to personnel.

- STEP 2. Remove CB7 from relay panel (WP 0061, Remove/Install Relay Panel).
- STEP 3. Place main DC circuit breaker in OFF/TRIP position (TM 9-6115-749-10).
- STEP 4. Reinstall CB7 to relay panel (WP 0061, Remove/Install Relay Panel).
- STEP 5. Test EMERGENCY STOP pushbutton, and replace as required (WP 0018, Repair DCS).

SYMPTOM

No power to convenience receptacle or convenience receptacle fails to work.

MALFUNCTION

Convenience receptacle is defective or has been subjected to a ground fault condition.

CORRECTIVE ACTION**WARNING**

Power is available to the convenience receptacle only when the main contactor is closed. Avoid accidental contact. Electrocution is possible. Failure to comply may cause injury or death to personnel.

- STEP 1. Ensure [CONTACTOR] reads [CLOSED] on the DCS screen and generator set is generating power.
- STEP 2. If contactor will not close, troubleshoot IAW Circuit interrupter will not close (Fault 1452) or open symptom (Fault 1453).

NOTE

MEP 1030 and MEP 1031 contain a duplex receptacle as the convenience receptacle and a Ground Fault Interrupter (GFI) located inside the rear access door.

- STEP 3. If generator set is operating and the [CONTACTOR] reads [CLOSED] (TM 9-6115-749-10), reset GFCI convenience receptacle or GFI and reset circuit breaker located above GFCI convenience receptacle as required (WP 0056, Remove/Install Convenience Receptacle). Proceed to Step 4.

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 4. If circuit breaker located above convenience receptacle will not reset, replace circuit breaker (WP 0056, Remove/Install Convenience Receptacle).
- STEP 5. If GFI will not reset, replace GFI (WP 0056, Remove/Install Convenience Receptacle).

WARNING

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

- STEP 6. If symptom continues (GFI and/or circuit breaker will not reset), replace convenience receptacle (WP 0056, Remove/Install Convenience Receptacle).
- STEP 7. If symptom continues, shutdown generator set and remove battery ground cable (WP 0036, Remove/Install Batteries). Inspect wiring from L1, neutral, and ground output terminals to circuit breaker and GFI (Foldout Pages) for loose wires, corrosion, frayed wires, or damaged insulation.
- STEP 8. Repair or replace wires as required (WP 0056, Remove/Install Convenience Receptacle and WP 0093, General Maintenance).
- STEP 9. If symptom continues, ensure battery ground cable is disconnected (WP 0036, Remove/Install Batteries), disconnect wires as required, and test all wires for shorts or opens using a multimeter set to test continuity (Foldout Pages and WP 0093, General Maintenance).
- STEP 10. Repair or replace wires as required (WP 0056, Remove/Install Convenience Receptacle and WP 0093, General Maintenance).
- STEP 11. If symptom continues, troubleshoot IAW [Fault 1445: Short Circuit] (WP 0008, Electrical System Troubleshooting with a DCS Code).

SYMPTOM

Circuit interrupter will not close or open.

MALFUNCTION

Contactor or wiring malfunction.

CORRECTIVE ACTION

Troubleshoot IAW [Fault 1452: Genset Contactor Fail To Close] (WP 0008, Electrical System Troubleshooting with a DCS Code).

SYMPTOM

Hour meter is no longer recording operating hours.

MALFUNCTION

Defective hour meter.

TROUBLESHOOTING PROCEDURES – CONTINUED**CORRECTIVE ACTION****WARNING**

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

NOTE

Wires P2-T and P2-a run from DCS J2 to connector P2, which runs to P500. From P500, the wires go into the printed circuit board module pins 37 and 46 of J500. Wires M3-A and M3-C run from the printed circuit board module to the hour meter.

- STEP 1. Check wiring from hour meter to printed circuit board module for loose connections, bent tabs or pins, or frayed wiring (WP 0097, Wiring Diagrams).
- STEP 2. Repair or replace wiring as required (WP 0093, General Maintenance and WP 0058, Remove/Install Printed Circuit Board Module).
- STEP 3. If symptom continues, check wiring from DCS to printed circuit board module for loose connections, bent tabs or pins, or frayed wiring (Foldout Pages).
- STEP 4. Repair or replace wiring as required (WP 0093, General Maintenance and WP 0059, Remove/Install Engine Wiring Harness).
- STEP 5. If symptom continues, ensure battery ground cable is disconnected (WP 0036, Remove/Install Batteries), disconnect wires as required, and check all wiring for shorts or opens using a multimeter set to test continuity (WP 0093, General Maintenance).
- STEP 6. Repair or replace as required (WP 0093, General Maintenance; WP 0058, Remove/Install Printed Circuit Board Module; and WP 0059, Remove/Install Engine Wiring Harness).
- STEP 7. If symptom continues, replace hour meter (WP 0055, Remove/Install Hour Meter).
- STEP 8. If symptom continues, check DCS LEDs, and replace DCS as required (WP 0018, Repair DCS and WP 0017, Remove/Install DCS).

END OF WORK PACKAGE

FIELD MAINTENANCE
ENGINE SYSTEM TROUBLESHOOTING WITH A DCS CODE

INITIAL SETUP:**Test Equipment**

Test Set, Electronic Systems (WP 0162, Table 2, Item 27)
 Cable, Remote Control (WP 0162, Table 2, Item 6)
 Cable, Remote Control (WP 0162, Table 2, Item 7)

Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Personnel Required

91D (1)

References

TM 9-6115-749-10
 WP 0008, Electrical System Troubleshooting with a DCS Code
 WP 0011, Engine System Troubleshooting without a DCS Code
 WP 0012, Exhaust System Troubleshooting without a DCS Code
 WP 0013, Winterization Kit Troubleshooting
 WP 0016, Field PMCS, Including Lubrication Instructions
 WP 0017, Remove/Install DCS
 WP 0018, Repair DCS
 WP 0019, Remove/Install Air Intake Hose Assemblies
 WP 0020, Service Air Cleaner Assembly
 WP 0029, Remove/Install Front Body Panel
 WP 0036, Remove/Install Batteries
 WP 0039, Service Fuel System
 WP 0040, Remove/Install Fuel Manifold

References - cont'd

WP 0041, Remove/Install Fuel Pump, Main/Auxiliary
 WP 0042, Remove/Install Fuel Filter/Water Separator Assembly
 WP 0043, Remove/Install Fuel Filter/Water Separator Element
 WP 0059, Remove/Install Engine Wiring Harness
 WP 0060, Remove/Install Power Wiring Harness
 WP 0061, Remove/Install Relay Panel
 WP 0062, Test Engine Compression
 WP 0063, Test Engine Oil Pressure
 WP 0064, Remove/Install 50/60 Hz Engine Assembly
 WP 0065, Remove/Install 400 Hz Engine Assembly
 WP 0066, Service Lubrication System
 WP 0067, Remove/Install Engine Speed Sensor
 WP 0068, Remove/Install Glow Plugs
 WP 0069, Remove/Install Fuel Injector
 WP 0070, Remove/Install Speed Control Plate
 WP 0071, Remove/Install Fuel Injection Pump
 WP 0075, Remove/Install Battery-Charging Alternator Assembly
 WP 0077, Remove/Install Starter
 WP 0078, Remove/Install Governor Actuator
 WP 0083, Check/Adjust Engine Valves
 WP 0084, Remove/Install Oil Pan and Strainer
 WP 0085, Remove/Install Flywheel
 WP 0086, Remove/Install Crankcase Rear Bearing Case Cover
 WP 0093, General Maintenance
 WP 0096, Replace Cylinder Head Gasket
 Foldout Pages

TROUBLESHOOTING PROCEDURE(S)**ENGINE SYSTEM TROUBLESHOOTING WITH A DCS CODE****WARNING**

Hearing protection is required during maintenance or repair with engine running. Failure to comply can cause hearing loss.

TROUBLESHOOTING PROCEDURES – CONTINUED**WARNING**

When operating, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow engine to cool before checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.

WARNING

Exhaust discharge contains deadly gases, including carbon monoxide. Exhaust gases are most dangerous in places with poor ventilation. Do not operate generator set in an enclosed area unless exhaust discharge is properly vented. Failure to comply may cause injury or death to personnel.

WARNING

High voltage is produced when generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Do not ground yourself in standing water. Never attempt to connect or disconnect load cables while the generator sets are running. Failure to comply may cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

WARNING

Fuels used in the generator set are combustible. Do not smoke or use open fire when performing maintenance. Fire and possible explosion may result. Failure to comply may cause injury or death to personnel and damage to equipment.

CAUTION

Operating generator set with doors open or with panels removed for an extended length of time will cause engine to overheat. Do not operate generator with doors open or panels removed for longer than necessary to complete your task. Monitor DCS temperature indicator to prevent engine overheating. Failure to comply will cause damage to equipment.

NOTE

Always perform PMCS prior to beginning any troubleshooting procedure (WP 0016, Field PMCS, Including Lubrication Instructions).

Read the entire corrective action sequence before beginning steps to complete corrective action for a malfunction.

FAULT RESET switch must be pushed to clear each fault code as it is addressed.

Capture spilled fluids and dispose of IAW local SOP.

SYMPTOM

[Fault 234: Overspeed Shutdown] displayed on DCS screen.

TROUBLESHOOTING PROCEDURES – CONTINUED**NOTE**

[Warning 1992: High Speed Warning] displays on DCS when engine speed is 9% greater than rated speed. [Fault 234: Overspeed Shutdown] occurs when engine speed is 10% greater than rated speed.

MALFUNCTION

Large block load removal or vapor drawn into intake air passage.

CORRECTIVE ACTION

- STEP 1. Shut down and restart generator set (TM 9-6115-749-10).
- STEP 2. If symptom continues, adjust engine speed sensor (WP 0067, Remove/Install Engine Speed Sensor).
- STEP 3. If symptom continues, troubleshoot IAW [Fault 115: Speed Signal Lost] (WP 0008, Electrical System Troubleshooting with a DCS Code).

WARNING

Fuels used in the generator set are combustible. Do not smoke or use open fire when performing maintenance. Fire and possible explosion may result. Failure to comply may cause injury or death to personnel and damage to equipment.

- STEP 4. If symptom continues, check for source of flammable vapor being drawn into the intake air passage.
- STEP 5. Remove source of flammable vapor or relocate generator set as required.
- STEP 6. If symptom continues, troubleshoot IAW [Warning 2967: Governor Fault] displayed on DCS screen symptom (WP 0008, Electrical System Troubleshooting with a DCS Code).
- STEP 7. If symptom continues, replace speed control plate (WP 0070, Remove/Install Speed Control Plate).

SYMPTOM

[Fault 359: Fail to Start] displayed on DCS screen.

NOTE

[Fault 359: Fail to Start] displays once a failure to start results after a continuous crank engage time of 75 sec.

MALFUNCTION

Fuel tank is empty.

CORRECTIVE ACTION

- STEP 1. Visually check to see if there is fuel in the tank and check DCS screen for fuel status (TM 9-6115-749-10).
- STEP 2. If tank is empty, fill fuel tank (TM 9-6115-749-10).
- STEP 3. If symptom continues, ensure governor actuator connector is installed to wiring harness, and install as required (WP 0078, Remove/Install Governor Actuator).

TROUBLESHOOTING PROCEDURES – CONTINUED

STEP 4. If symptom continues, inspect wiring harness at main and auxiliary fuel pumps, and ensure two connectors are installed to correct fuel pumps (WP 0041, Remove/Install Fuel Pump, Main/Auxiliary, WP 0059, Remove/Install Engine Wiring Harness; and Foldout Pages).

STEP 5. If symptom continues, proceed to next malfunction.

MALFUNCTION

Dirty air cleaner element, intake air hose restriction, or excess backpressure.

CORRECTIVE ACTION

STEP 1. Check air cleaner element and replace as required (WP 0020, Service Air Cleaner).

STEP 2. Inspect intake hose for restriction or signs of damage and replace as required (WP 0019, Remove/Install Air Intake Hose Assemblies).

STEP 3. If symptom continues, check for excess backpressure IAW High Pitched Hiss or Whistle Heard at Exhaust Outlet with a Decrease in Engine Performance symptom (WP 0012, Exhaust System Troubleshooting without a DCS Code).

STEP 4. If symptom continues, proceed to next malfunction.

MALFUNCTION

Fuel system malfunction.

CORRECTIVE ACTION

STEP 1. Check fuel filter/water separator for water, and drain fuel filter/water separator as required (TM 9-6115-749-10).

STEP 2. If symptom continues, check fuel flow and purge fuel lines (WP 0039, Service Fuel System).

STEP 3. If symptom continues, inspect fuel manifold by fuel filter/water separator for incorrect connections and clogs. Repair or replace as required (WP 0043, Remove/Install Fuel Filter/Water Separator Assembly).

STEP 4. If symptom continues, service fuel strainers if not already serviced (WP 0039, Service Fuel System), and inspect fuel manifold for leaks or damage. Repair or replace as required (WP 0040, Remove/Install Fuel Manifold).

STEP 5. If symptom continues, proceed to next malfunction.

MALFUNCTION

Fuel injection timing incorrect or governor actuator malfunction.

CORRECTIVE ACTION

STEP 1. Troubleshoot IAW [Warning 2967: Governor Fault] (WP 0008, Electrical System Troubleshooting with a DCS Code).

STEP 2. Check fuel injection timing, and adjust as required (WP 0071, Remove/Install Fuel Injection Pump).

TROUBLESHOOTING PROCEDURES – CONTINUED

STEP 3. If symptom continues, proceed to next malfunction.

MALFUNCTION

Improper clearance (open or close timing) of intake/exhaust valves.

CORRECTIVE ACTION

STEP 1. Adjust valve clearance (WP 0083, Check/Adjust Engine Valves).

STEP 2. If symptom continues, proceed to next malfunction.

MALFUNCTION

Cold weather conditions.

CORRECTIVE ACTION**NOTE**

Glow plugs will turn on between 20 and -25 °F (-6 and -32 °C) and winterization kit will turn on below -25 °F (-32 °C).

STEP 1. Allow time for winterization kit/starting aids to work if outside normal temperature range (TM 9-6115-749-10).

STEP 2. If malfunction is suspected, troubleshoot IAW Cold Weather Starting Aids Fail to Work Properly (WP 0011, Engine System Troubleshooting without a DCS Code).

STEP 3. If not operating in cold weather conditions, proceed to next malfunction.

MALFUNCTION

Leaking cylinder head gasket.

CORRECTIVE ACTION

STEP 1. Visually inspect area around cylinder head gasket for leaks or signs of separation. Replace cylinder head gasket as required (WP 0096, Replace Cylinder Head Gasket).

STEP 2. If symptom continues, examine oil on dipstick for evidence of coolant or other foreign fluid (TM 9-6115-749-10).

STEP 3. If coolant or foreign fluid is found, change oil if not already changed as a result of troubleshooting (WP 0066, Service Lubrication System).

STEP 4. If oil remains contaminated with coolant or foreign fluid, check engine compression (WP 0062, Test Engine Compression).

STEP 5. If compression is low or erratic or oil remains contaminated with coolant or foreign fluid, replace cylinder head gasket (WP 0096, Replace Cylinder Head Gasket).

STEP 6. If symptom continues, proceed to next malfunction.

MALFUNCTION

Fuel injection malfunction.

TROUBLESHOOTING PROCEDURES – CONTINUED**CORRECTIVE ACTION**

- STEP 1. Check fuel injection lines for loose nuts or leakage and replace or repair as required (WP 0069, Remove/Install Fuel Injector).
- STEP 2. If symptom continues, test fuel injectors and replace as required (WP 0069, Remove/Install Fuel Injector).
- STEP 3. If symptom continues, replace fuel injection pump (WP 0071, Remove/Install Fuel Injection Pump).
- STEP 4. If symptom continues, proceed to next malfunction.

MALFUNCTION

Internal engine problem.

CORRECTIVE ACTION

Replace engine (WP 0064, Remove/Install 50/60 Hz Engine Assembly or WP 0065, Remove/Install 400 Hz Engine Assembly).

SYMPTOM

[Fault 415: Low Oil Pressure] displayed on DCS screen.

NOTE

[Warning 143: Pre-Low Oil Pressure] will display on DCS when oil pressure reaches 15 psi (1.05 kg/cm²) at rated load or 13 psi (0.9 kg/cm²) at idle. [Fault 415: Low Oil Pressure] will display on the DCS and cause a generator set shutdown when oil pressure reaches 10 psi (0.6 kg/cm²) at rated load or 8 psi (0.5 kg/cm²) at idle.

MALFUNCTION

Low engine oil level.

CORRECTIVE ACTION**WARNING**

Allow engine to cool from normal operating temperature prior to draining engine oil and removing oil filter. Failure to comply may cause injury or death to personnel.

NOTE

Capture drained engine oil and dispose of IAW local SOP.

- STEP 1. Check engine oil level and appearance. If oil appears diluted or contaminated, proceed to next malfunction or add engine oil as required (TM 9-6115-749-10).
- STEP 2. If engine oil was added in Step 1, proceed to Step 4.
- STEP 3. If engine oil was not added in Step 1, proceed to next malfunction.
- STEP 4. Check oil lines for leaks or damage at fuel injection pump and engine oil drain valve and hose. Repair as required (WP 0066, Service Lubrication System and WP 0071, Remove/Install Fuel Injection Pump).

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 5. If symptom continues, inspect area around flywheel and AC generator for signs of oil leaks. Replace crankcase rear bearing case cover if signs of oil leaks are found (WP 0086, Remove/Install Crankcase Rear Bearing Case Cover).
- STEP 6. If low and no leaks are found, troubleshoot IAW Excessive Oil Consumption symptom (WP 0011, Engine System Troubleshooting without a DCS Code).

MALFUNCTION

Diluted engine oil.

CORRECTIVE ACTION**WARNING**

When operating, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow engine to cool before checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.

- STEP 1. Examine oil on dipstick for evidence of coolant or other foreign fluid (TM 9-6115-749-10).
- STEP 2. If coolant or foreign fluid is found, change oil and oil filter, if not already changed as a result of troubleshooting (WP 0066, Service Lubrication System).
- STEP 3. If oil remains contaminated with coolant or foreign fluid, check engine compression (WP 0062, Test Engine Compression).
- STEP 4. If compression is low or erratic or oil remains contaminated with coolant or foreign fluid, replace cylinder head gasket (WP 0096, Replace Cylinder Head Gasket).
- STEP 5. If compression check does not reveal fault and coolant or foreign fluid is no longer on dipstick, proceed to next malfunction.
- STEP 6. If coolant or foreign fluid continues to show on dipstick after cylinder head gasket replacement, replace engine assembly (WP 0064, Remove/Install 50/60 Hz Engine Assembly or WP 0065, Remove/Install 400 Hz Engine Assembly).

MALFUNCTION

Defective engine oil pressure sender.

CORRECTIVE ACTION

- STEP 1. Perform oil pressure test to determine engine oil pressure on DCS screen is accurate (WP 0063, Test Engine Oil Pressure).
- STEP 2. If oil pressure reading on DCS is not accurate, troubleshoot IAW [Warning 135: Oil Pressure Sensor High] symptom (WP 0008, Electrical System Troubleshooting with a DCS Code).
- STEP 3. If symptom continues or oil pressure reading is accurate, proceed to next malfunction.

MALFUNCTION

Clogged oil strainer.

TROUBLESHOOTING PROCEDURES – CONTINUED**CORRECTIVE ACTION**

STEP 1. Inspect and replace oil strainer as required (WP 0084, Remove/Install Oil Pan and Strainer).

STEP 2. If strainer is not clogged or symptom continues, proceed to next malfunction.

MALFUNCTION

Internal engine problem.

CORRECTIVE ACTION

Replace engine (WP 0064, Remove/Install 50/60 Hz Engine Assembly or WP 0065, Remove/Install 400 Hz Engine Assembly).

SYMPTOM

[Fault 1438: Fail to Crank] displayed on DCS screen.

NOTE

[Fault 1438: Fail to Crank] displays when the engine fails to rotate or the DCS fails to sense the engine rotation. When engine control switch turns over the engine, but [Fault 1438: Fail to Crank] appears and prevents starting, the malfunction is speed signal related. See [Fault 115: Speed Signal Lost] WP 0008, Electrical System Troubleshooting with a DCS Code).

MALFUNCTION

DEAD CRANK SWITCH is not in NORMAL position or will not turn over engine.

CORRECTIVE ACTION

STEP 1. Ensure the DEAD CRANK SWITCH is in NORMAL position (TM 9-6115-749-10).

STEP 2. If not in NORMAL position, place DEAD CRANK SWITCH in the NORMAL position (TM 9-6115-749-10).

STEP 3. If symptom continues, use DEAD CRANK SWITCH to turn over engine (TM 9-6115-749-10).

STEP 4. If engine turns over, proceed to Defective wiring or DCS malfunction.

STEP 5. If engine does not turn over, proceed to next malfunction.

MALFUNCTION

Battery connections are loose or batteries are insufficiently charged.

CORRECTIVE ACTION**WARNING**

Do not damage batteries. Storage batteries are filled with a liquid acid that can leak from sealed battery when case is broken. Contact with acidic liquid can burn skin and eyes. Wear safety goggles and chemical

TROUBLESHOOTING PROCEDURES – CONTINUED

gloves and avoid acid splash while handling damaged batteries. Do not move batteries by terminals. Failure to comply may cause injury or death to personnel or damage to equipment.

- STEP 1. Check for corroded or loose battery connections. Clean/replace corroded battery connections and tighten loose battery connections as required (WP 0036, Remove/Install Batteries).
- STEP 2. Check DCS voltage meter for a reading less than 24 VDC indicating battery voltage is low (TM 9-6115-749-10).
- STEP 3. If battery voltage is not low, proceed to next malfunction.
- STEP 4. If battery voltage is low, use a multimeter selected for the appropriate VDC scale to measure the voltage of each battery at the battery terminals (WP 0093, General Maintenance and WP 0036, Remove/Install Batteries).
- STEP 5. Charge batteries, start engine utilizing the NATO slave receptacle and an outside 24 VDC power source, or replace batteries as required (WP 0036, Remove/Install Batteries and WP 0093, General Maintenance).
- STEP 6. Start generator set and observe DCS [Battery] [Adc] indicator to ensure battery charging alternator is charging batteries properly (TM 9-6115-749-10). Test battery-charging alternator if batteries are not charging properly, and replace battery-charging alternator or components as required (WP 0075, Remove/Install Battery-Charging Alternator).
- STEP 7. If symptom continues, proceed to next malfunction.

MALFUNCTION

Defective starter or flywheel.

CORRECTIVE ACTION

- STEP 1. Test starter and replace as required (WP 0077, Remove/Install Starter).
- STEP 2. If symptom continues, check flywheel for damage or obstruction. Repair or replace as required (WP 0085, Remove/Install Flywheel).
- STEP 3. If symptom continues, proceed to next malfunction.

MALFUNCTION

Defective wiring or DCS.

CORRECTIVE ACTION

- STEP 1. Test relay K10 for resistance and proper operation and replace as required (WP 0061, Remove/Install Relay Panel).

NOTE

When performing starter test in Step 2, use engine control switch in the START position instead of using DEAD CRANK SWITCH. Test will determine if DCS is supplying voltage to the starter.

- STEP 2. If symptom continues, test starter IAW WP 0077, Remove/Install Starter using START position of engine control switch.

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 3. If proper voltage is detected at starter, replace starter as required if not already replaced (WP 0077, Remove/Install Starter).
- STEP 4. If low or no voltage is detected at starter, remove battery ground cable (WP 0036, Remove/Install Batteries) and test starter wiring leads for shorts or opens using wiring diagrams (Foldout Pages) and a multimeter set to test continuity (WP 0093, General Maintenance).
- STEP 5. Repair or replace wiring as required (WP 0093, General Maintenance; WP 0060, Remove/Install Power Wiring Harness).
- STEP 6. If symptom continues, ensure battery ground cable is removed (WP 0036, Remove/Install Batteries) and use wiring diagrams (Foldout Pages) and a multimeter set to test continuity to check wires P3-Y and P2-L for opens or shorts (WP 0093, General Maintenance).
- STEP 7. Repair or replace wiring as required (WP 0093, General Maintenance; WP 0059, Remove/Install Engine Wiring Harness).
- STEP 8. If symptom continues, test engine control switch and replace as required (WP 0018, Repair DCS).
- STEP 9. If symptom continues, check DCS LEDs and replace DCS as required (WP 0018, Repair DCS and WP 0017, Remove/Install DCS).

SYMPTOM

[Warning 143: Pre-Low Oil Pressure] displayed on DCS screen.

NOTE

[Warning 143: Pre-Low Oil Pressure] will display on DCS when oil pressure reaches 15 psi (1.05 kg/cm²) at rated load or 13 psi (0.9 kg/cm²) at idle. [Fault 415: Low Oil Pressure] will display on the DCS and cause a generator set shutdown when oil pressure reaches 10 psi (0.6 kg/cm²) at rated load or 8 psi (0.5 kg/cm²) at idle.

MALFUNCTION

Engine oil malfunction.

CORRECTIVE ACTION

Troubleshoot IAW [Fault 415: Low Oil Pressure] displayed on DCS screen symptom.

SYMPTOM

[Warning 1992: High Speed Warning] displayed on DCS screen.

MALFUNCTION

Engine speed malfunction.

CORRECTIVE ACTION

Troubleshoot IAW [Fault 234: Overspeed Shutdown] displayed on DCS screen symptom.

END OF WORK PACKAGE

FIELD MAINTENANCE

ENGINE SYSTEM TROUBLESHOOTING WITHOUT A DCS CODE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Personnel Required

91D (1)

References

TM 9-6115-749-10
 WP 0008, Electrical System Troubleshooting with a DCS Code
 WP 0010, Engine System Troubleshooting with a DCS Code
 WP 0012, Exhaust System Troubleshooting Without a DCS Code
 WP 0013, Winterization Kit Troubleshooting
 WP 0016, Field PMCS, Including Lubrication Instructions
 WP 0017, Remove/Install DCS
 WP 0018, Repair DCS
 WP 0019, Remove/Install Air Intake Hose Assemblies
 WP 0020, Service Air Cleaner Assembly
 WP 0021, Service Cooling System
 WP 0022, Remove/Install Coolant Recovery System
 WP 0024, Remove/Install Radiator Hose and Tube Assemblies
 WP 0025, Remove/Install Winterization Kit Components
 WP 0027, Remove/Install Radiator
 WP 0036, Remove/Install Batteries
 WP 0039, Service Fuel System
 WP 0040, Remove/Install Fuel Manifold
 WP 0041, Remove/Install Fuel Pump, Main/Auxiliary
 WP 0042, Remove/Install Fuel Filter/Water Separator Assembly

References - cont'd

WP 0044, Remove/Install Fuel Hoses and Clamp Bands
 WP 0046, Remove/Install Fuel Tank
 WP 0047, Remove/Install Fuel Tank Drain Valve Assembly
 WP 0048, Remove/Install Fuel Tank Filler Neck
 WP 0060, Remove/Install Power Wiring Harness
 WP 0061, Remove/Install Relay Panel
 WP 0062, Test Engine Compression
 WP 0064, Remove/Install 50/60 Hz Engine Assembly
 WP 0065, Remove/Install 400 Hz Engine Assembly
 WP 0066, Service Lubrication System
 WP 0068, Remove/Install Glow Plugs
 WP 0069, Remove/Install Fuel Injector
 WP 0071, Remove/Install Fuel Injection Pump
 WP 0073, Remove/Install Thermostat
 WP 0074, Remove/Install Water Pump
 WP 0075, Remove/Install Battery-Charging Alternator Assembly
 WP 0076, Remove/Install Battery-Charging Alternator Belt
 WP 0077, Remove/Install Starter
 WP 0082, Remove/Install Valve Cover
 WP 0083, Check/Adjust Engine Valves
 WP 0084, Remove/Install Oil Pan and Strainer
 WP 0085, Remove/Install Flywheel
 WP 0086, Remove/Install Crankcase Rear Bearing Case Cover
 WP 0093, General Maintenance
 WP 0096, Replace Cylinder Head Gasket
 Foldout Pages

TROUBLESHOOTING PROCEDURE(S)

ENGINE SYSTEM TROUBLESHOOTING WITHOUT A DCS CODE

WARNING

Allow engine to cool from normal operating temperature prior to draining engine oil and removing oil filter. Failure to comply may cause injury or death to personnel.

WARNING

Fuels used in the generator set are combustible. Do not smoke or use open fire when performing maintenance. Fire and possible explosion may result. Failure to comply may cause injury or death to personnel and damage to equipment.

WARNING

Fuels used in the generator set are combustible. Ensure fuel source grounding strap is connected to unit fuel fill grounding stud (fuel fill static ground). When filling the fuel tank, maintain metal-to-metal contact between filler nozzle and fuel tank opening to eliminate **ESD**. Fire and possible explosion can result. Failure to comply may cause injury or death to personnel.

WARNING

Fuel is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash exposed skin and change soaked clothing promptly if exposed to fuel. Failure to comply may cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

WARNING

High voltage is produced when generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Do not ground yourself in standing water. Never attempt to connect or disconnect load cables while the generator sets are running. Failure to comply may cause injury or death to personnel.

WARNING

Hearing protection is required during maintenance or repair with engine running. Failure to comply can cause hearing loss.

WARNING

When operating, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow engine to cool before checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.

TROUBLESHOOTING PROCEDURES – CONTINUED**WARNING**

Exhaust discharge contains deadly gases, including carbon monoxide. Exhaust gases are most dangerous in places with poor ventilation. Do not operate generator set in an enclosed area unless exhaust discharge is properly vented. Failure to comply may cause injury or death to personnel.

CAUTION

Operating generator set with doors open or with panels removed for an extended length of time will cause engine to overheat. Do not operate generator with doors open or panels removed for longer than necessary to complete your task. Monitor DCS temperature indicator to prevent engine overheating. Failure to comply may cause damage to equipment.

NOTE

Always perform PMCS prior to beginning any troubleshooting procedure (WP 0016, Field PMCS, Including Lubrication Instructions).

Read the entire corrective action sequence before beginning steps to complete corrective action for a malfunction.

Capture spilled fluids and dispose of IAW local SOP.

SYMPTOM

Evidence of fluid leakage found around engine.

NOTE

Capture spilled fluids and dispose of IAW local SOP.

MALFUNCTION

Engine is leaking oil.

CORRECTIVE ACTION**WARNING**

When operating, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow engine to cool before checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.

- STEP 1. Check for oil leaks at oil filter. Replace or repair as required (WP 0066, Service Lubrication System).
- STEP 2. If loose, tighten oil filter as required (WP 0066, Service Lubrication System).
- STEP 3. If symptom continues, inspect valve cover and valve cover gasket (WP 0082, Remove/Install Valve Cover). Replace as required.
- STEP 4. If symptom continues, inspect engine oil drain valve and hose (WP 0066, Service Lubrication System).
- STEP 5. Replace line if found to be leaking or damaged (WP 0066, Service Lubrication System).

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 6. If symptom continues, inspect area around flywheel and AC generator for signs of oil leaks. Replace crankcase rear bearing case cover assembly as required (WP 0086, Remove/Install Crankcase Rear Bearing Case Cover).
- STEP 7. If symptom continues, inspect oil pan. Replace oil pan as required (WP 0084, Remove/Install Oil Pan and Strainer).
- STEP 8. If symptom continues with Class III leak, replace engine assembly (WP 0064, Remove/Install 50/60 Hz Engine Assembly or WP 0065, Remove/Install 400 Hz Engine Assembly).

MALFUNCTION

Engine is leaking coolant.

CORRECTIVE ACTION**WARNING**

Engine coolant is toxic to eyes and poisonous if ingested. Eye protection is required when working with engine coolant. Avoid repeated or prolonged contact. Failure to comply may cause injury or death to personnel.

WARNING

Hot coolant can burn. If the radiator cap is hot to the touch, it is too hot to open. Allow the coolant to cool before opening the radiator cap. Wear gloves, additional protective clothing, and goggles as required. Contact with high-pressure steam and/or liquids can cause burns and scalding. Failure to comply may cause injury or death to personnel.

CAUTION

Be sure to close radiator cap securely to avoid coolant leakage. Engine may overheat if cap is loose. Failure to comply may cause damage to equipment.

- STEP 1. Inspect radiator hoses and coolant recovery bottle and hoses for leaks. Repair or replace as required (WP 0022, Remove/Install Coolant Recovery System and WP 0024, Remove/Install Radiator Hose and Tube Assemblies).
- STEP 2. If symptom continues, inspect radiator and test cap (WP 0027, Remove/Install Radiator and WP 0021, Service Cooling System). Replace as required.
- STEP 3. If symptom continues, inspect water pump and/or thermostat for leaks. Replace as required (WP 0074, Remove/Install Water Pump and WP 0073, Remove/Install Thermostat).
- STEP 4. If symptom continues, inspect winterization kit, if applicable, and repair or replace as required (WP 0025, Remove/Install Winterization Kit Components).
- STEP 5. If symptom continues, inspect cylinder head gasket and freeze plugs on engine for signs of a Class III leak. Replace cylinder head gasket and/or freeze plugs as required (WP 0096, Replace Cylinder Head Gasket and WP 0093, General Maintenance).
- STEP 6. If symptom continues, examine oil on dipstick for evidence of coolant or other foreign fluid.

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 7. If evidence of coolant or other foreign fluid is found on dipstick, check engine compression (WP 0062, Test Engine Compression).
- STEP 8. Replace engine as required (WP 0064, Remove/Install 50/60 Hz Engine Assembly or WP 0065, Remove/Install 400 Hz Engine Assembly).

MALFUNCTION

Engine is leaking fuel.

CORRECTIVE ACTION**WARNING**

Do not operate generator set if any fuel leaks are present. Fuel is combustible. Always perform PMCS before operation. Failure to comply may cause injury or death to personnel.

- STEP 1. Inspect all fuel hoses (WP 0044, Remove/Install Fuel Hoses and Clamp Bands). Replace as required.
- STEP 2. If symptom continues, inspect fuel filter/water separator assembly (WP 0042, Remove/Install Fuel Filter/Water Separator Assembly). Replace as required.
- STEP 3. If symptom continues, inspect fuel injectors, fuel injection pump, and lines (WP 0069, Remove/Install Fuel Injector and WP 0071, Remove/Install Fuel Injection Pump). Replace as required.
- STEP 4. If symptom continues, inspect fuel tank (WP 0046, Remove/Install Fuel Tank) and fuel filler neck (WP 0048, Remove/Install Fuel Tank Filler Neck) for leaks. Replace as required.
- STEP 5. If symptom continues, tighten fuel drain line valve, if necessary, and inspect fuel drain line for leaks (WP 0047, Remove/Install Fuel Tank Drain Valve Assembly). Repair or replace as required.
- STEP 6. If symptom continues, inspect fuel pumps and fuel manifold for leaks (WP 0041, Remove/Install Fuel Pump, Main/Auxiliary and WP 0040, Remove/Install Fuel Manifold). Replace as required.

SYMPTOM

Engine cranks slowly and fails to start.

MALFUNCTION

Battery connections are loose or batteries are insufficiently charged.

CORRECTIVE ACTION**WARNING**

Do not damage batteries. Storage batteries are filled with a liquid acid that can leak from sealed battery when case is broken. Contact with acidic liquid can burn skin and eyes. Wear safety goggles and chemical gloves and avoid acid splash while handling damaged batteries. Do not move batteries by terminals. Failure to comply may cause injury or death to personnel or damage to equipment.

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 1. Check for corroded or loose battery connections. Clean/replace corroded battery connections and tighten loose battery connections as required (WP 0036, Remove/Install Batteries).
- STEP 2. Check DCS voltage meter for a reading less than 24 VDC indicating battery voltage is low (TM 9-6115-749-10).
- STEP 3. If battery voltage is not low, proceed to next malfunction.
- STEP 4. If battery voltage is low, use a multimeter selected for the appropriate VDC scale to measure the voltage of each battery at the battery terminals (WP 0093, General Maintenance and WP 0036).
- STEP 5. Charge batteries, start engine utilizing the NATO slave receptacle and an outside 24 VDC power source, or replace batteries as required (WP 0036, Remove/Install Batteries and WP 0093, General Maintenance).
- STEP 6. Start generator set and observe DCS [Battery] [Adc] indicator to ensure battery-charging alternator is charging batteries properly (TM 9-6115-749-10). Test battery-charging alternator if batteries are not charging properly and replace as required (WP 0075, Remove/Install Battery-Charging Alternator).
- STEP 7. If symptom continues, proceed to next malfunction.

MALFUNCTION

Dirty air cleaner element or intake air restriction.

CORRECTIVE ACTION

- STEP 1. Check air cleaner element and replace as required (WP 0020, Service Air Cleaner).
- STEP 2. If symptom continues, inspect intake hose for restriction or signs of damage and replace as required (WP 0019, Remove/Install Air Intake Hose Assemblies).
- STEP 3. If symptom continues, check exhaust system for excess backpressure IAW High Pitched Hiss or Whistle Heard at Exhaust Outlet with a Decrease in Engine Performance symptom (WP 0012, Exhaust System Troubleshooting without a DCS Code).
- STEP 4. If symptom continues, proceed to next malfunction.

MALFUNCTION

Fuel system malfunction.

CORRECTIVE ACTION

- STEP 1. Check fuel filter/water separator for water and drain fuel filter/water separator as required (TM 9-6115-749-10).
- STEP 2. If symptom continues, check fuel flow and purge fuel lines (WP 0039, Service Fuel System).
- STEP 3. If symptom continues, inspect fuel manifold by fuel filter/water separator for incorrect connections and clogs. Repair or replace as required (WP 0042, Remove/Install Fuel Filter/Water Separator Assembly).
- STEP 4. If symptom continues, service fuel strainers if not already serviced (WP 0039, Service Fuel System), and inspect fuel manifold for leaks or damage. Repair or replace as required (WP 0040, Remove/Install Fuel Manifold).

TROUBLESHOOTING PROCEDURES – CONTINUED

STEP 5. If symptom continues, proceed to next malfunction.

MALFUNCTION

Fuel injection timing incorrect or governor actuator malfunction.

CORRECTIVE ACTION

- STEP 1. If symptom continues, troubleshoot IAW [Warning 2967: Governor Fault] displayed on DCS screen symptom (WP 0008, Electrical System Troubleshooting with a DCS Code).
- STEP 2. Check fuel injection timing, and adjust as required (WP 0071, Remove/Install Fuel Injection Pump).

MALFUNCTION

Cold weather conditions.

CORRECTIVE ACTION**NOTE**

Glow plugs will turn on between 20 and -25 °F (-6 and -32 °C) and winterization kit will turn on at -25 °F and below.

- STEP 1. Allow time for winterization kit/starting aids to work if outside normal temperature range (TM 9-6115-749-10).
- STEP 2. If malfunction is suspected, proceed to Cold Weather Starting Aids Fail to Work Properly symptom.
- STEP 3. If not operating in cold start conditions, proceed to next malfunction.

MALFUNCTION

Starter is defective/wiring is incorrect.

CORRECTIVE ACTION

- STEP 1. Test starter and replace as required (WP 0077, Remove/Install Starter).
- STEP 2. If symptom continues, ensure wiring is correctly installed to starter and adjust as required (WP 0077, Remove/Install Starter).

WARNING

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

- STEP 3. If symptom continues, ensure battery ground cable is removed (WP 0036, Remove/Install Batteries) and test starter wiring leads for shorts using wiring diagrams (Foldout Pages) and a multimeter set to test continuity (WP 0093, General Maintenance).

TROUBLESHOOTING PROCEDURES – CONTINUED

STEP 4. Repair or replace wiring as required (WP 0093, General Maintenance and WP 0060, Remove/Install Power Wiring Harness).

STEP 5. If symptom continues, proceed to next malfunction.

MALFUNCTION

Flywheel is defective.

CORRECTIVE ACTION

STEP 1. Inspect starter/flywheel connection and look for damaged or missing flywheel teeth.

STEP 2. If flywheel is defective (missing teeth), replace flywheel (WP 0085, Remove/Install Flywheel).

STEP 3. If symptom continues or flywheel is not defective, proceed to next malfunction.

MALFUNCTION

Fuel injection malfunction.

CORRECTIVE ACTION

STEP 1. Check fuel injection lines for loose nuts or leakage. Replace or repair as required (WP 0069, Remove/Install Fuel Injector).

STEP 2. If symptom continues, test fuel injectors and replace as required (WP 0069, Remove/Install Fuel Injector).

STEP 3. If symptom continues, replace fuel injection pump (WP 0071, Remove/Install Fuel Injection Pump).

STEP 4. If symptom continues, proceed to next malfunction.

MALFUNCTION

Internal engine problem.

CORRECTIVE ACTION

Replace engine (WP 0064, Remove/Install 50/60 Hz Engine Assembly or WP 0065, Remove/Install 400 Hz Engine Assembly).

SYMPTOM

Engine will not shut down.

MALFUNCTION

Governor actuator malfunction.

CORRECTIVE ACTION

STEP 1. Use EMERGENCY STOP pushbutton to shut down generator set (TM 9-6115-749-10).

TROUBLESHOOTING PROCEDURES – CONTINUED

STEP 2. Troubleshoot IAW [Warning 2967: Governor Fault] displayed on DCS screen symptom (WP 0008, Electrical System Troubleshooting with a DCS Code).

STEP 3. If symptom continues, proceed to next malfunction.

MALFUNCTION

Engine control switch fault.

CORRECTIVE ACTION

STEP 1. Rotate engine control switch and confirm that engine control switch is not between two positions.

STEP 2. Confirm proper installation of engine control switch (WP 0018, Repair DCS).

STEP 3. Check for loose or damaged wires (WP 0018, Repair DCS).

STEP 4. Test engine control switch and replace as required (WP 0018, Repair DCS).

STEP 5. If symptom continues, test DCS LEDs and replace DCS as required (WP 0017, Remove/Install DCS).

SYMPTOM

Engine cranks normally but fails to start.

MALFUNCTION

Engine system malfunction.

CORRECTIVE ACTION

Troubleshoot IAW [Fault 359: Fail to Start] displayed on DCS screen symptom (WP 0010, Engine System Troubleshooting with a DCS Code).

SYMPTOM

Engine starts but stops after starting.

MALFUNCTION

No or low fuel.

CORRECTIVE ACTION

STEP 1. Check fuel tank. Fill as required (WP 0039, Service Fuel System).

STEP 2. If symptom continues, proceed to next malfunction.

MALFUNCTION

Fuel system malfunction.

CORRECTIVE ACTION

STEP 1. Check fuel filter/water separator for water and drain fuel filter/water separator as required (TM 9-6115-749-10).

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 2. If symptom continues, check fuel flow and purge fuel lines (WP 0039, Service Fuel System).
- STEP 3. If symptom continues, inspect fuel manifold by fuel filter/water separator for incorrect connections and clogs. Repair or replace as required (WP 0042, Remove/Install Fuel Filter/Water Separator Assembly).
- STEP 4. If symptom continues, service fuel strainers if not already serviced (WP 0039, Service Fuel System), and inspect fuel manifold for leaks or damage. Repair or replace as required (WP 0040, Remove/Install Fuel Manifold).
- STEP 5. If symptom continues, proceed to next malfunction.

MALFUNCTION

Dirty air cleaner element or intake air restriction.

CORRECTIVE ACTION

- STEP 1. Check air cleaner element and replace as required (WP 0020, Service Air Cleaner).
- STEP 2. If symptom continues, inspect intake hose for restriction or signs of damage and replace as required (WP 0019, Remove/Install Air Intake Hose Assemblies).
- STEP 3. If symptom continues, check exhaust system for excess backpressure IAW High Pitched Hiss or Whistle Heard at Exhaust Outlet with a Decrease in Engine Performance symptom (WP 0012, Exhaust System Troubleshooting without a DCS Code).
- STEP 4. If symptom continues, proceed to next malfunction.

MALFUNCTION

Fuel injection timing incorrect or governor actuator malfunction.

CORRECTIVE ACTION

- STEP 1. If symptom continues, troubleshoot IAW [Warning 2967: Governor Fault] displayed on DCS screen symptom (WP 0008, Electrical System Troubleshooting with a DCS Code).
- STEP 2. Check fuel injection timing, and adjust as required (WP 0071, Remove/Install Fuel Injection Pump).
- STEP 3. If symptom continues, proceed to next malfunction.

MALFUNCTION

Engine control switch fault.

CORRECTIVE ACTION

- STEP 1. Rotate engine control switch and confirm that engine control switch is not between two positions.
- STEP 2. If symptom continues, confirm proper installation of engine control switch and check for loose or damaged wires (WP 0018, Repair DCS).

TROUBLESHOOTING PROCEDURES – CONTINUED

STEP 3. If symptom continues, test engine control switch and replace as required (WP 0018, Repair DCS).

STEP 4. If symptom continues, proceed to next malfunction.

MALFUNCTION

Fuel injection or DCS malfunction.

CORRECTIVE ACTION

STEP 1. Check fuel injection lines for loose nuts or leakage. Replace or repair as required (WP 0069, Remove/Install Fuel Injector).

STEP 2. If symptom continues, test fuel injectors and replace as required (WP 0069, Remove/Install Fuel Injector).

STEP 3. If symptom continues, replace fuel injection pump (WP 0071, Remove/Install Fuel Injection Pump).

STEP 4. If symptom continues, check DCS LEDs and replace DCS (WP 0017, Remove/Install DCS).

SYMPTOM

Engine stops suddenly during normal operation.

MALFUNCTION

Engine malfunction.

CORRECTIVE ACTION

Troubleshoot IAW Engine Starts but Stops After Starting symptom.

SYMPTOM

Engine runs erratically, performs poorly (does not develop full power), or misfires.

MALFUNCTION

Dirty air cleaner element.

CORRECTIVE ACTION

STEP 1. Check air filter restriction indicator and inspect air cleaner element (TM 9-6115-749-10). Replace air cleaner element as required (TM 9-6115-749-10).

STEP 2. If symptom continues, check exhaust system for excess backpressure IAW High Pitched Hiss or Whistle Heard at Exhaust Outlet with a Decrease in Engine Performance symptom (WP 0012, Exhaust System Troubleshooting without a DCS Code).

STEP 3. If symptom continues, proceed to next malfunction.

MALFUNCTION

Insufficient oil level.

TROUBLESHOOTING PROCEDURES – CONTINUED**CORRECTIVE ACTION**

- STEP 1. Check oil level and fill as required (WP 0066, Service Lubrication System).
- STEP 2. If symptom continues, proceed to next malfunction.

MALFUNCTION

Fuel system malfunction.

CORRECTIVE ACTION

- STEP 1. Check fuel filter/water separator for water and drain fuel filter/water separator as required (TM 9-6115-749-10).
- STEP 2. If symptom continues, check fuel flow and purge fuel lines (WP 0039, Service Fuel System).
- STEP 3. If symptom continues, inspect fuel manifold by fuel filter/water separator for incorrect connections and clogs. Repair or replace as required (WP 0042, Remove/Install Fuel Filter/Water Separator Assembly).
- STEP 4. If symptom continues, service fuel strainers if not already serviced (WP 0039, Service Fuel System) and inspect fuel manifold for leaks or damage (WP 0040, Remove/Install Fuel Manifold).
- STEP 5. If symptom continues, proceed to next malfunction.

MALFUNCTION

Fuel injection timing or governor actuator malfunction.

CORRECTIVE ACTION

- STEP 1. Troubleshoot IAW [Warning 2967: Governor Fault] displayed on DCS screen symptom (WP 0008, Electrical System Troubleshooting with a DCS Code).
- STEP 2. If symptom continues, check fuel injection timing and adjust as required (WP 0071, Remove/Install Fuel Injection Pump).
- STEP 3. If symptom continues, proceed to next malfunction.

MALFUNCTION

Valves improperly adjusted.

CORRECTIVE ACTION

- STEP 1. Adjust valves (WP 0083, Check/Adjust Engine Valves).
- STEP 2. If symptom continues, proceed to next malfunction.

MALFUNCTION

Fuel injection malfunction.

CORRECTIVE ACTION

- STEP 1. Check fuel injection lines for loose nuts or leakage. Replace or repair as required (WP 0069, Remove/Install Fuel Injector).

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 2. If symptom continues, test fuel injectors and replace as required (WP 0069, Remove/Install Fuel Injector).
- STEP 3. If symptom continues, replace fuel injection pump (WP 0071, Remove/Install Fuel Injection Pump).
- STEP 4. If symptom continues, proceed to next malfunction.

MALFUNCTION

Internal engine problem.

CORRECTIVE ACTION

Replace engine (WP 0064, Remove/Install 50/60 Hz Engine Assembly or WP 0065, Remove/Install 400 Hz Engine Assembly).

SYMPTOM

Engine stability or hunting problems.

MALFUNCTION

High or low ambient temperatures.

CORRECTIVE ACTION

Adjust gain settings (WP 0017, Remove/Install DCS).

SYMPTOM

Excessive oil consumption.

MALFUNCTION

Oil change overdue, incorrect grade or type (for ambient temperature range), or oil level too high.

CORRECTIVE ACTION

- STEP 1. Perform a lubrication system change (WP 0066, Service Lubrication System).
- STEP 2. If symptom continues, proceed to next malfunction.

MALFUNCTION

Leakage from oil lines, oil filter, or valve cover.

CORRECTIVE ACTION**WARNING**

When operating, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow engine to cool before checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 1. Check for oil leaks at oil filter. Replace or repair as required (WP 0066, Service Lubrication System).
- STEP 2. If loose, tighten oil filter as required (WP 0066, Service Lubrication System).
- STEP 3. Inspect valve cover and valve cover gasket (WP 0082, Remove/Install Valve Cover). Replace as required.
- STEP 4. Inspect engine oil drain valve and hose (WP 0066, Service Lubrication System).
- STEP 5. Replace line if found to be leaking or damaged (WP 0066, Service Lubrication System).
- STEP 6. If symptom continues, proceed to next malfunction.

MALFUNCTION

Diluted engine oil.

CORRECTIVE ACTION

- STEP 1. Examine oil on dipstick for evidence of coolant or other foreign fluid (TM 9-6115-749-10).
- STEP 2. Change oil, if not already changed as a result of troubleshooting (WP 0066, Service Lubrication System).
- STEP 3. If oil remains contaminated with coolant or foreign fluid, check engine compression (WP 0062, Test Engine Compression).
- STEP 4. If compression check reveals fault, replace cylinder head gasket (WP 0096, Replace Cylinder Head Gasket).
- STEP 5. If compression check does not reveal fault and coolant or foreign fluid is no longer on dipstick, proceed to next malfunction.
- STEP 6. If coolant or foreign fluid continues to show on dipstick after cylinder head gasket has been replaced, replace engine assembly (WP 0064, Remove/Install 50/60 Hz Engine Assembly or WP 0065, Remove/Install 400 Hz Engine Assembly).

MALFUNCTION

Leaking crankcase rear bearing case cover seal.

CORRECTIVE ACTION

- STEP 1. Inspect area around flywheel and AC generator for signs of oil leaks.
- STEP 2. Replace crankcase rear bearing case cover assembly if signs of oil leaks are found (WP 0086, Remove/Install Crankcase Rear Bearing Case Cover).
- STEP 3. If symptom continues, proceed to next malfunction.

MALFUNCTION

Crankcase breather hose clogged.

CORRECTIVE ACTION

- STEP 1. Remove and clean crankcase breather hose (WP 0082, Remove/Install Valve Cover).

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 2. Replace as required (WP 0082, Remove/Install Valve Cover).
- STEP 3. If symptom continues, proceed to Engine Runs Erratically, Performs Poorly (Does Not Develop Full Power), or Misfires symptom.
- STEP 4. If symptom continues, proceed to next malfunction.

MALFUNCTION

Improper seal of oil pan or clogged oil strainer.

CORRECTIVE ACTION

- STEP 1. Replace oil pan or repair seal (WP 0084, Remove/Install Oil Pan and Strainer).
- STEP 2. Inspect and replace oil strainer as required (WP 0084, Remove/Install Oil Pan and Strainer).
- STEP 3. If strainer is not clogged or symptom continues, proceed to next malfunction.

MALFUNCTION

Fuel injection malfunction.

CORRECTIVE ACTION

- STEP 1. Check fuel injector spray pattern and replace fuel injectors as required (WP 0069, Remove/Install Fuel Injector).
- STEP 2. If symptom continues, proceed to next malfunction.

MALFUNCTION

Internal engine problem.

CORRECTIVE ACTION

Replace engine assembly (WP 0064, Remove/Install 50/60 Hz Engine Assembly or WP 0065, Remove/Install 400 Hz Engine Assembly).

SYMPTOM

Engine knocks or makes excessive noise.

MALFUNCTION

Oil level low.

CORRECTIVE ACTION**WARNING**

When operating, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow engine to cool before checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 1. Check engine oil level and refill as required (WP 0066, Service Lubrication System).
- STEP 2. Troubleshoot IAW Excessive Oil Consumption symptom.
- STEP 3. If symptom continues, proceed to next malfunction.

MALFUNCTION

Fuel injection or governor actuator malfunction.

CORRECTIVE ACTION

- STEP 1. Troubleshoot IAW [Warning 2967: Governor Fault] displayed on DCS screen symptom (WP 0008, Electrical System Troubleshooting with a DCS Code).
- STEP 2. If symptom continues, check fuel injection timing and adjust as required (WP 0071, Remove/Install Fuel Injection Pump).
- STEP 3. If symptom continues, check fuel injector spray pattern and replace fuel injectors as required (WP 0069, Remove/Install Fuel Injector).
- STEP 4. If symptom continues, proceed to next malfunction.

MALFUNCTION

Valves improperly adjusted.

CORRECTIVE ACTION

- STEP 1. Adjust valves (WP 0083, Check/Adjust Engine Valves).
- STEP 2. If symptom continues, proceed to next malfunction.

MALFUNCTION

Internal engine problem.

CORRECTIVE ACTION

Replace engine (WP 0064, Remove/Install 50/60 Hz Engine Assembly or WP 0065, Remove/Install 400 Hz Engine Assembly).

SYMPTOM

Abnormal or high pitched ascending and descending sounds heard from engine compartment.

MALFUNCTION

Dirty air cleaner element or intake air restriction.

CORRECTIVE ACTION

- STEP 1. Check air cleaner element, and replace as required (WP 0020, Service Air Cleaner).
- STEP 2. If symptom continues, inspect intake hose for restriction or signs of damage. Replace as required (WP 0019, Remove/Install Air Intake Hose Assemblies).
- STEP 3. If symptom continues, proceed to next malfunction.

TROUBLESHOOTING PROCEDURES – CONTINUED**MALFUNCTION**

Loose battery-charging alternator belt or defective pulleys.

CORRECTIVE ACTION

- STEP 1. Check battery-charging alternator belt for proper tension and tighten or replace belt as required (WP 0076, Remove/Install Battery-Charging Alternator Belt).
- STEP 2. Inspect water pump pulley and battery-charging alternator pulley for damage or restricted turning. Replace water pump pulley or battery-charging alternator as required (WP 0074, Remove/Install Water Pump and WP 0075, Remove/Install Battery-Charging Alternator Assembly).
- STEP 3. If symptom continues, proceed to next malfunction.

MALFUNCTION

Exhaust system malfunction.

CORRECTIVE ACTION

- STEP 1. Troubleshoot for high pitched hiss or whistle heard at exhaust outlet with decrease in engine performance (WP 0012, Exhaust System Troubleshooting without a DCS Code).
- STEP 2. If symptom continues, proceed to next malfunction.

MALFUNCTION

Engine problem.

CORRECTIVE ACTION

Troubleshoot IAW Engine Knocks or Makes Excessive Noise symptom.

SYMPTOM

White smoke seen emitting from engine compartment.

MALFUNCTION

Coolant leak.

CORRECTIVE ACTION**WARNING**

Cooling system operates at high temperature and pressure. Contact with high-pressure steam and/or liquids can cause burns and scalding. Shut down generator set and allow system to cool before performing checks, services, and maintenance. Wear gloves, additional protective clothing, and goggles as required. Failure to comply may cause injury or death to personnel.

- STEP 1. Inspect hoses for leaks (WP 0024, Remove/Install Radiator Hoses and Clamps). Replace as required.

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 2. If symptom continues, pressure test cooling system for evidence of leaks (WP 0021, Service Cooling System).
- STEP 3. Proceed to Step 5 if evidence of leaks are found.
- STEP 4. Proceed to next malfunction if no evidence of leaks are found.
- STEP 5. Inspect radiator and test cap (WP 0027, Remove/Install Radiator and WP 0021, Service Cooling System). Replace as required.
- STEP 6. Inspect water pump and/or thermostat for leaks (WP 0074, Remove/Install Water Pump and WP 0073, Remove/Install Thermostat). Replace as required.
- STEP 7. Inspect winterization kit for leaks, if applicable (WP 0025, Remove/Install Winterization Kit Components).
- STEP 8. Inspect freeze plugs on engine block for leaks and replace as required (WP 0093, General Maintenance).
- STEP 9. If symptom continues, proceed to next malfunction.

MALFUNCTION

Fuel injection timing or governor actuator malfunction.

CORRECTIVE ACTION

- STEP 1. Troubleshoot IAW [Warning 2967: Governor Fault] displayed on DCS screen symptom (WP 0008, Electrical System Troubleshooting with a DCS Code).
- STEP 2. If symptom continues, check fuel injection lines for loose nuts or leakage and replace or repair as required (WP 0069, Remove/Install Fuel Injector).
- STEP 3. If symptom continues, test fuel injectors and replace as required (WP 0069, Remove/Install Fuel Injector).
- STEP 4. If symptom continues, check fuel injection pump timing and adjust as required (WP 0071, Remove/Install Fuel Injection Pump).
- STEP 5. If symptom continues, proceed to next malfunction.

MALFUNCTION

Internal engine problem.

CORRECTIVE ACTION

Replace engine (WP 0064, Remove/Install 50/60 Hz Engine Assembly or WP 0065, Remove/Install 400 Hz Engine Assembly).

SYMPTOM

Blue or black smoke from engine compartment with strong odors.

MALFUNCTION

Wires burning.

CORRECTIVE ACTION

- STEP 1. Shut down generator set.

TROUBLESHOOTING PROCEDURES – CONTINUED**WARNING**

Wear heat resistant gloves and avoid contacting hot metal surfaces with hands and exposed skin after components have been heated. Wear additional protective clothing as required. Failure to comply may cause injury or death to personnel.

- STEP 2. Inspect engine compartment for fire/wires burning.
- STEP 3. Extinguish any flames IAW SOP.
- STEP 4. If fire is not visible, inspect wires for damage due to excessive heat or smell for odor of burned insulation.
- STEP 5. If evidence of wire burning is found, locate cause of problem before replacing any components or attempting restart.

SYMPTOM

Oil mixed with coolant.

MALFUNCTION

Leaking cylinder head assembly gasket or internal engine problem.

CORRECTIVE ACTION

- STEP 1. Replace cylinder head gasket (WP 0096, Replace Cylinder Head Gasket).
- STEP 2. If coolant or foreign fluid continues to show on dipstick after cylinder head gasket has been replaced, replace engine assembly (WP 0064, Remove/Install 50/60 Hz Engine Assembly or WP 0065, Remove/Install 400 Hz Engine Assembly).

SYMPTOM

Oil mixed with fuel.

MALFUNCTION

Internal engine problem.

CORRECTIVE ACTION

- STEP 1. Drain all fuel from system (WP 0039, Service Fuel System).
- STEP 2. Purge fuel system (WP 0039, Service Fuel System).
- STEP 3. If symptom continues, replace engine (WP 0064, Remove/Install 50/60 Hz Engine Assembly or WP 0065, Remove/Install 400 Hz Engine Assembly).

SYMPTOM

Cold weather starting aids fail to work properly.

MALFUNCTION

Cold weather starting aid malfunction.

TROUBLESHOOTING PROCEDURES – CONTINUED**CORRECTIVE ACTION****NOTE**

Glow plugs will turn on between 20 and -25 °F (-6 and -32 °C), and winterization kit will turn on at -25 °F and below.

- STEP 1. If using a generator set with a winterization kit and a malfunction is suspected, troubleshoot IAW WP 0013, Winterization Kit Troubleshooting.
- STEP 2. If not using a winterization kit or if another malfunction is suspected, test batteries and ensure battery voltage is at proper level (WP 0036, Remove/Install Batteries).
- STEP 3. If symptom continues, check for loose connections, moisture, loose pins or wires, or other damage at connections at relay panel and glow plugs (WP 0068, Remove/Install Glow Plugs and WP 0061, Remove/Install Relay Panel). Repair or replace as required WP 0093, General Maintenance).
- STEP 4. If symptom continues, check CB6 and K16 in relay panel for breaker trip and proper installation. Reset or seat properly as required (WP 0061, Remove/Install Relay Panel).
- STEP 5. If symptom continues, test CB6 and K16 for proper function (WP 0061, Remove/Install Relay Panel).
- STEP 6. If symptom continues, use a multimeter set to test VDC and wiring diagrams to check from wire P5B-F to a ground for proper voltage (approximately battery voltage value obtained in Step 2) (WP 0093, General Maintenance and Foldout Pages).
- STEP 7. If proper voltage is found, test glow plugs, and replace as required (WP 0068, Remove/Install Glow Plugs).
- STEP 8. If proper voltage is not found, use a multimeter set to test ohms and wiring diagrams to check wires P5B-F and P3-X for opens or shorts (WP 0093, General Maintenance and Foldout Pages). Repair or replace as required (WP 0093, General Maintenance).
- STEP 9. If symptom continues, check DCS LEDs, and replace DCS as required (WP 0018, Repair DCS and WP 0017, Remove/Install DCS).

END OF WORK PACKAGE

FIELD MAINTENANCE

EXHAUST SYSTEM TROUBLESHOOTING WITHOUT A DCS CODE

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Personnel Required

91D (1)

References

TM 9-6115-749-10
 WP 0009, Electrical System Troubleshooting without a DCS Code
 WP 0010, Engine System Troubleshooting with a DCS Code
 WP 0016, Field PMCS, Including Lubrication Instructions
 WP 0017, Remove/Install DCS
 WP 0019, Remove/Install Air Intake Hose Assemblies
 WP 0020, Service Air Cleaner Assembly

References - cont'd

WP 0025, Remove/Install Winterization Kit Components
 WP 0039, Service Fuel System
 WP 0043, Replace Fuel Filter/Water Separator Element
 WP 0064, Remove/Install 50/60 Hz Engine Assembly
 WP 0065, Remove/Install 400 Hz Engine Assembly
 WP 0066, Service Lubrication System
 WP 0068, Remove/Install Glow Plugs
 WP 0069, Remove/Install Fuel Injector
 WP 0071, Remove/Install Fuel Injection Pump
 WP 0076, Remove/Install Battery-Charging Alternator Belt
 WP 0079, Remove/Install Intake Manifold
 WP 0080, Remove/Install Exhaust Manifold
 WP 0081, Remove/Install Muffler
 WP 0083, Check/Adjust Engine Valves

TROUBLESHOOTING PROCEDURE(S)**EXHAUST SYSTEM TROUBLESHOOTING WITHOUT A DCS CODE****WARNING**

Exhaust discharge contains deadly gases, including carbon monoxide. Exhaust gases are most dangerous in places with poor ventilation. Do not operate generator set in an enclosed area unless exhaust discharge is properly vented. Failure to comply may cause injury or death to personnel.

WARNING

When operating, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow engine to cool before checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.

WARNING

Wear heat resistant gloves and avoid contacting hot metal surfaces with hands and exposed skin after components have been heated. Wear additional protective clothing as required. Failure to comply may cause injury or death to personnel.

WARNING

Hot exhaust gases can ignite combustible materials. Allow room for safe discharge of hot gases. Failure to comply may cause injury or death to personnel.

TROUBLESHOOTING PROCEDURES – CONTINUED**WARNING**

Never inject fuel near a fire source. Atomized fuel is highly combustible. Fuel pressure is high enough to penetrate skin. Ensure that spray from the injector nozzle is directed away from all personnel. Direct contact with spray can cause skin cell destruction and blood poisoning. Skin and eye protection are required when working in contact with fuel. Failure to comply may cause injury or death to personnel and damage to equipment.

WARNING

Fuel is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash skin and change clothing promptly if in contact with fuel. Failure to comply may cause injury or death to personnel.

WARNING

Fuels used in the generator set are combustible. Ensure fuel source grounding strap is connected to unit fuel fill grounding stud (fuel fill static ground). When filling the fuel tank, maintain metal-to-metal contact between filler nozzle and fuel tank opening to eliminate **ESD**. Fire and possible explosion can result. Failure to comply may cause injury or death to personnel.

WARNING

Fuels used in the generator set are combustible. Do not smoke or use open fire when performing maintenance. Fire and possible explosion may result. Failure to comply may cause injury or death to personnel and damage to equipment.

NOTE

Always perform PMCS prior to beginning any troubleshooting procedure (WP 0016, Field PMCS, Including Lubrication Instructions).

Read the entire corrective action sequence before beginning steps to complete corrective action for a malfunction.

SYMPTOM

High pitched hiss or whistle heard at exhaust outlet with a decrease in engine performance.

MALFUNCTION

High backpressure or restriction in exhaust system.

CORRECTIVE ACTION**WARNING**

Exhaust discharge contains deadly gases, including carbon monoxide. Exhaust gases are most dangerous in places with poor ventilation. Do not operate generator set in an enclosed area unless exhaust discharge is properly vented. Failure to comply may cause injury or death to personnel.

TROUBLESHOOTING PROCEDURES – CONTINUED**WARNING**

When operating, exhaust system has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow engine to cool before performing maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.

- STEP 1. Check exhaust outlet on top of generator set to be sure it is clear of obstructions.
- STEP 2. Check that protection cap is operating properly. Repair or replace as required (WP 0081, Remove/Install Muffler).
- STEP 3. Check pipes throughout exhaust system for dents or kinks that could be causing restriction in the exhaust system. Replace or repair as required (WP 0081, Remove/Install Muffler).
- STEP 4. Remove flex pipe and inspect muffler for visual damage, restriction, or excess carbon buildup. Remove restrictions, install or replace flex pipe as required, or replace muffler as required (WP 0081, Remove/Install Muffler).
- STEP 5. Inspect exhaust manifold for signs of damage or restriction. Remove restrictions or replace as required (WP 0080, Remove/Install Exhaust Manifold).
- STEP 6. If symptom continues, proceed to next malfunction.

MALFUNCTION

Internal engine problem.

CORRECTIVE ACTION

Replace engine assembly (WP 0064, Remove/Install 50/60 Hz Engine Assembly or WP 0065, Remove/Install 400 Hz Engine Assembly).

SYMPTOM

Abnormal sound heard in exhaust system with a decrease in engine performance.

MALFUNCTION

Exhaust system leak.

CORRECTIVE ACTION**WARNING**

Exhaust discharge contains deadly gases, including carbon monoxide. Exhaust gases are most dangerous in places with poor ventilation. Do not operate generator set in an enclosed area unless exhaust discharge is properly vented. Failure to comply may cause injury or death to personnel.

WARNING

When operating, exhaust system has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow engine to cool before performing maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 1. Check cylinder head to exhaust manifold connection, flex pipe to exhaust manifold connection, flex pipe to muffler connection, and muffler to rain cap connection for signs of damage or leaks (WP 0080, Remove/Install Exhaust Manifold and WP 0081, Remove/Install Muffler). Look for signs of heat escape such as discoloration or heat damage to surrounding components and discolored or burned paint around gasket and cylinder head exhaust outlet ports.
- STEP 2. Replace any connection or gasket that shows signs of damage or leaking (WP 0080, Remove/Install Exhaust Manifold and WP 0081, Remove/Install Muffler).
- STEP 3. If symptom continues, check muffler for damage or exhaust leaks. Replace as required (WP 0081, Remove/Install Muffler).
- STEP 4. If symptom continues, inspect exhaust manifold for cracks or signs of damage. Replace as required (WP 0080, Remove/Install Exhaust Manifold).
- STEP 5. If symptom continues, wrap wiping rags around exhaust pipes at areas susceptible to wear or corrosion and use pliers to gently squeeze for weak spots or damage. Replace exhaust pipes as required (WP 0081, Remove/Install Muffler).
- STEP 6. If operating generator set in cold weather conditions, inspect system for signs of water corrosion. If evidence of condensation is found, inspect and test winterization kit and glow plugs and replace as required (WP 0025, Remove/Install Winterization Kit Components and WP 0068, Remove/Install Glow Plugs).
- STEP 7. If symptom continues, proceed to next malfunction.

MALFUNCTION

Internal engine problem.

CORRECTIVE ACTION

Replace engine assembly (WP 0064, Remove/Install 50/60 Hz Engine Assembly or WP 0065, Remove/Install 400 Hz Engine Assembly).

SYMPTOM

Intermittent hissing or popping noise is heard when engine is running.

MALFUNCTION

Exhaust manifold gasket leak.

CORRECTIVE ACTION**WARNING**

Exhaust discharge contains deadly gases, including carbon monoxide. Exhaust gases are most dangerous in places with poor ventilation. Do not operate generator set in an enclosed area unless exhaust discharge is properly vented. Failure to comply may cause injury or death to personnel.

TROUBLESHOOTING PROCEDURES – CONTINUED**WARNING**

When operating, exhaust system has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow engine to cool before performing maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.

- STEP 1. Inspect exhaust manifold and cylinder head for discoloration or burning around exhaust outlet ports.
- STEP 2. Replace exhaust manifold gasket if discoloration or burning is found (WP 0080, Remove/Install Exhaust Manifold).
- STEP 3. If symptom continues, troubleshoot IAW Abnormal Sound Heard from Exhaust System with a Decrease in Engine Performance symptom.

SYMPTOM

Buzzing or rattling sound heard.

MALFUNCTION

Loose or missing hardware of exhaust component.

CORRECTIVE ACTION**WARNING**

Exhaust discharge contains deadly gases, including carbon monoxide. Exhaust gases are most dangerous in places with poor ventilation. Do not operate generator set in an enclosed area unless exhaust discharge is properly vented. Failure to comply may cause injury or death to personnel.

WARNING

When operating, exhaust system has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow engine to cool before performing maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.

- STEP 1. Check for loose or missing fasteners attaching heat shield to exhaust manifold (WP 0080, Remove/Install Exhaust Manifold).
- STEP 2. Tighten any loose fasteners and replace any missing fasteners (WP 0080, Remove/Install Exhaust Manifold).
- STEP 3. Use a small pry bar to gently press on heat shield to check for broken welds or damage. Replace as required (WP 0080, Remove/Install Exhaust Manifold).
- STEP 4. Check muffler hardware and fasteners for loose fasteners, missing parts, or broken welds. Replace or repair as required (WP 0081, Remove/Install Muffler).
- STEP 5. Check exhaust outlet connection at muffler connections and exhaust pipes for missing clamps, loose hardware, or damage. Replace or tighten hardware as required (WP 0081, Remove/Install Muffler).

TROUBLESHOOTING PROCEDURES – CONTINUED**SYMPTOM**

Engine emits blue or black smoke with insufficient engine output.

MALFUNCTION

Overloaded generator set.

CORRECTIVE ACTION

- STEP 1. Increase generator set size or reduce load usage.
- STEP 2. Troubleshoot electrical system for load issues (WP 0010, Electrical System Troubleshooting without a DCS Code).
- STEP 3. If symptoms continue, proceed to next malfunction.

MALFUNCTION

Dirty air cleaner element.

CORRECTIVE ACTION

- STEP 1. Check the air cleaner element and service air cleaner assembly as needed (WP 0020, Service Air Cleaner).
- STEP 2. If symptoms continue, proceed to next malfunction.

MALFUNCTION

Obstruction in air intake system

CORRECTIVE ACTION

- STEP 1. Check air intake hoses for kinks, damage, or signs of restriction. Replace as required (WP 0019, Remove/Install Air Intake Hose Assemblies).

WARNING

When operating, exhaust system has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow engine to cool before performing maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.

- STEP 2. Inspect intake manifold for cracks or damage. Inspect air intake hose to intake manifold. Replace either as required (WP 0079, Remove/Install Intake Manifold).
- STEP 3. If symptom continues, proceed to next malfunction.

MALFUNCTION

High backpressure or restriction in exhaust system.

TROUBLESHOOTING PROCEDURES – CONTINUED**CORRECTIVE ACTION****WARNING**

Exhaust discharge contains deadly gases, including carbon monoxide. Exhaust gases are most dangerous in places with poor ventilation. Do not operate generator set in an enclosed area unless exhaust discharge is properly vented. Failure to comply may cause injury or death to personnel.

WARNING

When operating, exhaust system has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow engine to cool before performing maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.

- STEP 1. Check exhaust outlet on top of generator set to be sure it is clear of obstructions (WP 0081, Remove/Install Muffler).
- STEP 2. Check that protection cap is operating properly. Repair or replace as required (WP 0081, Remove/Install Muffler).
- STEP 3. Check pipes throughout exhaust system for dents or kinks that could be causing restriction in the exhaust system. Replace or repair as required (WP 0081, Remove/Install Muffler).
- STEP 4. Remove flex pipe and inspect muffler for visual damage, restriction, or excess carbon buildup. Remove restrictions, install or replace flex pipe as required, or replace muffler as required (WP 0081, Remove/Install Muffler).
- STEP 5. Inspect exhaust manifold for signs of damage or restriction. Remove restrictions or replace as required (WP 0080, Remove/Install Exhaust Manifold).
- STEP 6. If symptom continues, proceed to next malfunction.

MALFUNCTION

Improper or contaminated fuel.

CORRECTIVE ACTION

- STEP 1. Drain fuel tank and refill with clean fuel (WP 0039, Service Fuel System).
- STEP 2. Drain fuel filter/water separator (TM 9-6115-749-10) and replace fuel filter/water separator element (WP 0043, Remove/Install Fuel Filter/Water Separator Element).
- STEP 3. If symptom continues, proceed to next malfunction.

MALFUNCTION

Improper open or close timing of intake/exhaust valves.

CORRECTIVE ACTION

- STEP 1. Adjust valve clearance (WP 0083, Check/Adjust Engine Valves).
- STEP 2. If symptom continues, proceed to next malfunction.

TROUBLESHOOTING PROCEDURES – CONTINUED**MALFUNCTION**

Too much oil in oil pan/too much oil added.

CORRECTIVE ACTION

STEP 1. Drain oil from engine and refill with proper amount (WP 0066, Service Lubrication System).

STEP 2. If symptom continues, proceed to next malfunction.

MALFUNCTION

Engine used at high temperatures or at high altitude.

CORRECTIVE ACTION

STEP 1. Adjust governor gain and/or reduce load as required (WP 0017, Remove/Install DCS).

STEP 2. If symptom continues, proceed to next malfunction.

MALFUNCTION

Fuel injection timing incorrect or governor actuator malfunction.

CORRECTIVE ACTION

STEP 1. Troubleshoot IAW [Warning 2967: Governor Fault] displayed on DCS screen symptom (WP 0009, Electrical System Troubleshooting with a DCS Code).

STEP 2. If symptom continues, check fuel injection lines for loose nuts or leakage. Repair or replace as required (WP 0069, Remove/Install Fuel Injector).

STEP 3. If symptoms continue, check fuel injection timing and adjust as required (WP 0071, Remove/Install Fuel Injection Pump).

STEP 4. If symptom continues, test fuel injectors and replace as required (WP 0069, Remove/Install Fuel Injector).

STEP 5. If symptom continues, replace fuel injection pump (WP 0071, Remove/Install Fuel Injection Pump).

STEP 6. If symptom continues, proceed to next malfunction.

MALFUNCTION

Internal engine problem.

CORRECTIVE ACTION

Replace engine (WP 0064, Remove/Install 50/60 Hz Engine Assembly or WP 0065, Remove/Install 400 Hz Engine Assembly).

SYMPTOM

Engine emits white exhaust smoke.

TROUBLESHOOTING PROCEDURES – CONTINUED**MALFUNCTION**

Fuel contaminated or improper fuel used.

CORRECTIVE ACTION

- STEP 1. Inspect fuel type being used and check with specification on labels and in manual (TM 9-6115-749-10).
- STEP 2. Drain fuel tank and refill with clean fuel (WP 0039, Service Fuel System).
- STEP 3. Replace fuel filter/water separator element (WP 0043, Remove/Install Fuel Filter/Water Separator Element).
- STEP 4. If symptom continues, proceed to next malfunction.

MALFUNCTION

Excessive slack in battery-charging alternator belt causing water pump malfunction.

CORRECTIVE ACTION

- STEP 1. Check belt for wear and proper tension and replace or adjust as required (WP 0076, Remove/Install Battery-Charging Alternator Belt).
- STEP 2. If symptom continues, proceed to next malfunction.

MALFUNCTION

Clogged exhaust pipe or muffler.

CORRECTIVE ACTION**WARNING**

Exhaust discharge contains deadly gases, including carbon monoxide. Exhaust gases are most dangerous in places with poor ventilation. Do not operate generator set in an enclosed area unless exhaust discharge is properly vented. Failure to comply may cause injury or death to personnel.

WARNING

When operating, exhaust system has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow engine to cool before performing maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.

- STEP 1. Check exhaust outlet on top of generator set to be sure it is clear of obstructions (WP 0081, Remove/Install Muffler).
- STEP 2. Check that protection cap is operating properly. Repair or replace as required (WP 0081, Remove/Install Muffler).
- STEP 3. Check pipes throughout exhaust system for dents or kinks that could be causing restriction in the exhaust system. Replace or repair as required (WP 0081, Remove/Install Muffler).

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 4. Remove flex pipe and inspect muffler for visual damage, restriction, or excess carbon buildup. Remove restrictions, install or replace flex pipe as required, or replace muffler as required (WP 0081, Remove/Install Muffler).
- STEP 5. Inspect exhaust manifold for signs of damage or restriction. Remove restrictions or replace as required (WP 0080, Remove/Install Exhaust Manifold).
- STEP 6. If symptom continues, proceed to next malfunction.

MALFUNCTION

Clogged air filter.

CORRECTIVE ACTION

- STEP 1. Replace air filter (TM 9-6115-749-10).
- STEP 2. If symptom continues, proceed to next malfunction.

MALFUNCTION

Improper intake and exhaust valve open/closure.

CORRECTIVE ACTION

- STEP 1. Adjust engine valves (WP 0083, Check/Adjust Engine Valves).
- STEP 2. If symptom continues, proceed to next malfunction.

MALFUNCTION

Engine used at high temperatures or at high altitude.

CORRECTIVE ACTION

- STEP 1. Reduce load as required.
- STEP 2. If symptom continues, proceed to next malfunction.

MALFUNCTION

Fuel injection timing incorrect or governor actuator malfunction.

CORRECTIVE ACTION

- STEP 1. If symptom continues, troubleshoot IAW [Warning 2967: Governor Fault] displayed on DCS screen symptom (WP 0009, Electrical System Troubleshooting with a DCS Code).
- STEP 2. If symptom continues, check fuel injection lines for loose nuts or leakage. Repair or replace as required (WP 0069, Remove/Install Fuel Injector).
- STEP 3. If symptom continues, test fuel injectors and replace as required (WP 0069, Remove/Install Fuel Injector).
- STEP 4. Check fuel injection timing and adjust as required (WP 0071, Remove/Install Fuel Injection Pump).

TROUBLESHOOTING PROCEDURES – CONTINUED

STEP 5. If symptom continues, replace fuel injection pump (WP 0071, Remove/Install Fuel Injection Pump).

STEP 6. If symptom continues, proceed to next malfunction.

MALFUNCTION

Internal engine problem.

CORRECTIVE ACTION

Replace engine (WP 0064, Remove/Install 50/60 Hz Engine Assembly or WP 0065, Remove/Install 400 Hz Engine Assembly).

END OF WORK PACKAGE

FIELD MAINTENANCE

WINTERIZATION KIT TROUBLESHOOTING

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Personnel Required

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References

TM 9-6115-749-10
 WP 0008, Electrical System Troubleshooting with a DCS Code
 WP 0009, Electrical System Troubleshooting without a DCS Code

References - cont'd

WP 0017, Remove/Install DCS
 WP 0018, Repair DCS
 WP 0025, Remove/Install Winterization Kit Components
 WP 0036, Remove/Install Batteries
 WP 0037, Remove/Install Main DC Circuit Breaker
 WP 0039, Service Fuel System
 WP 0059, Remove/Install Engine Wiring Harness
 WP 0075, Remove/Install Battery-Charging Alternator Assembly
 WP 0093, General Maintenance
 Foldout Pages

TROUBLESHOOTING PROCEDURE(S)**WINTERIZATION KIT TROUBLESHOOTING****WARNING**

Eye protection is required when working with compressed air. Do not use compressed air to clean skin. Do not aim at personnel. Compressed air can propel particles at high velocity and injure eyes. Failure to comply may cause injury or death to personnel.

WARNING

Fuels used in the generator set are combustible. Do not smoke or use open fire when performing maintenance. Fire and possible explosion may result. Failure to comply may cause injury or death to personnel and damage to equipment.

NOTE

Always perform PMCS prior to beginning any troubleshooting procedure (WP 0016, Field PMCS, Including Lubrication Instructions).

Read the entire corrective action sequence before beginning steps to complete corrective action for a malfunction.

FAULT RESET switch must be pushed to clear each fault code as it is addressed.

Capture spilled fuel and dispose of IAW local SOP.

SYMPTOM

[Warning 3663: Winterization Kit Failure to Heat] displayed on DCS screen.

NOTE

[Warning 3663: Winterization Kit Failure to Heat] displays on DCS when coolant temperature fails to rise 5 °F (2.75 °C) in 5 min.

TROUBLESHOOTING PROCEDURES – CONTINUED**MALFUNCTION**

Fuel tank is empty.

CORRECTIVE ACTION**NOTE**

Capture spilled fuel and dispose of IAW local SOP. Cap/plug all open fuel lines/fittings to prevent dirt and debris from entering the fuel system.

- STEP 1. Fill fuel tank as required (WP 0039, Service Fuel System).
- STEP 2. If symptom continues, proceed to next malfunction.

MALFUNCTION

Clogged intake port.

CORRECTIVE ACTION**WARNING**

Eye protection is required when working with compressed air. Do not use compressed air to clean skin. Do not aim at personnel. Compressed air can propel particles at high velocity and injure eyes. Failure to comply may cause injury or death to personnel.

- STEP 1. Clean air intake port with compressed air.
- STEP 2. If symptom continues, proceed to next malfunction.

MALFUNCTION

Clogged exhaust pipe.

CORRECTIVE ACTION

- STEP 1. Remove exhaust pipe (WP 0025, Remove/Install Winterization Kit Components).

WARNING

Eye protection is required when working with compressed air. Do not use compressed air to clean skin. Do not aim at personnel. Compressed air can propel particles at high velocity and injure eyes. Failure to comply may cause injury or death to personnel.

- STEP 2. Clean exhaust pipe with compressed air.
- STEP 3. If symptom continues, proceed to next malfunction.

MALFUNCTION

Clogged winterization kit fuel pump or malfunctioning fuel pump.

CORRECTIVE ACTION**NOTE**

Capture spilled fuel and dispose of IAW local SOP. Cap/plug all open fuel lines/fittings to prevent dirt and debris from entering the fuel system.

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 1. Perform fuel flow test (WP 0025, Remove/Install Winterization Kit Components).
- STEP 2. Test and replace fuel system components (WP 0039, Service Fuel System) or replace winterization kit if necessary (WP 0025, Remove/Install Winterization Kit Components).
- STEP 3. If symptom continues, proceed to next malfunction.

MALFUNCTION

Winterization kit wiring or DCS failure.

CORRECTIVE ACTION**WARNING**

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

NOTE

CB201-LOAD/P20A-1 (positive battery current) runs between main DC circuit breaker (CB201) and winterization kit (L20). Winterization kit wires P2-R (signal) and P2-U (negative) run between DCS P2 and winterization kit connectors.

Wire P2-R runs between DCS P2 and P20A at winterization kit. J20C-4 runs from plug P20A (pin 2) on winterization kit (L20, BROWN) and J20C-2 runs from P21-2 (fuel metering pump (M21, pin 2)). Both wires junction at J20C. Wire P2-U is the return from J20C to DCS P2. P20A-4 (green) runs between winterization kit and fuel metering pump (P21-1 to M21).

- STEP 1. Use wiring diagrams (Foldout Pages) to locate and check winterization kit wiring at P20A, P21, J20C, CB201, and DCS P2 for loose connections and bent or broken pins.
- STEP 2. Install connections, or repair or replace as required (WP 0059, Remove/Install Engine Wiring Harness, WP 0037, Remove/Install Main DC Circuit Breaker; and WP 0093, General Maintenance).
- STEP 3. If symptom continues, turn engine control switch to PRIME & RUN without starting generator set (TM 9-6115-749-10), remove connector P20A from winterization kit, and check voltage between pins P20A-1 and P20A-2 using a multimeter set to test VDC (WP 0093, General Maintenance).
- STEP 4. If voltage is greater than 21 VDC, proceed to Step 10.
- STEP 5. If voltage is equal to or less than 21 VDC, proceed to Step 6.
- STEP 6. Install P20A and test batteries. Charge or replace as required (WP 0036, Remove/Install Batteries).
- STEP 7. If symptom continues, remove battery ground cable (WP 0036, Remove/Install Batteries), remove wires from components as required, and use wiring diagrams and a multimeter set to test continuity, check CB201-LOAD and P2-U for opens or shorts (WP 0093, General Maintenance and Foldout Pages).

TROUBLESHOOTING PROCEDURES – CONTINUED

- STEP 8. Replace or repair wiring as required (WP 0093, General Maintenance and WP 0059, Remove/Install Engine Wiring Harness).
- STEP 9. If symptom continues, check DCS LEDs, and replace DCS as required (WP 0018, Repair DCS and WP 0017, Remove/Install DCS). Resume operation.
- STEP 10. Leave P20A unplugged, and select winterization kit test from DCS screen (TM 9-6115-749-10).
- STEP 11. Use a multimeter set to test VDC, check voltage between pins P20A-7 and P20A-2 (WP 0093, General Maintenance).
- STEP 12. Record voltage, and stop winterization kit test (TM 9-6115-749-10).
- STEP 13. If voltage is greater than 21 VDC, proceed to Step 17.
- STEP 14. If voltage is equal to or less than 21 VDC, remove battery ground cable (WP 0036, Remove/Install Batteries), and use wiring diagrams and a multimeter set to test ohms, check wire P2-R for shorts or opens (WP 0093, General Maintenance and Foldout Pages).
- STEP 15. Repair or replace wire P2-R as required (WP 0093, General Maintenance and WP 0059, Remove/Install Engine Wiring Harness).
- STEP 16. If symptom continues, troubleshoot IAW Defective DCS Malfunction Under DCS Has No Power or No Lighted Display symptom (WP 0009, Electrical System Troubleshooting without a DCS Code).
- STEP 17. Select winterization kit test from DCS screen (TM 9-6115-749-10), and proceed to Step 18.
- STEP 18. Install P20A to winterization kit, and remove P21 from fuel metering pump at winterization kit.
- STEP 19. Use a multimeter set to test VDC, check voltage between pins P21-1 and P21-2 (WP 0093, General Maintenance).
- STEP 20. If voltage is within 11.97 to 14.63 VDC range, replace fuel metering pump (WP 0025, Remove/Install Winterization Kit Components).
- STEP 21. If voltage is not within 11.97 to 14.63 VDC range, remove battery ground cable (WP 0036, Remove/Install Batteries) and use a multimeter set to test continuity and wiring diagrams, check connector J20C and wires P20A-4 (green), J20C-2, and P2-U for opens or shorts (WP 0093, General Maintenance and Foldout Pages).
- STEP 22. Repair or replace wires or connectors as required (WP 0059, Remove/Install Engine Wiring Harness and WP 0093, General Maintenance).
- STEP 23. If symptom continues, replace winterization kit (WP 0025, Remove/Install Winterization Kit Components).

SYMPTOM

[Warning 3671: Winterization Kit Low Voltage Warning] displayed on DCS screen.

WARNING

The right-hand battery negative lead that connects directly to the grounding stud must be disconnected prior to disconnecting or removing batteries. Follow procedural steps in exact order given for removal and installation. Failure to comply may cause injury or death to personnel.

TROUBLESHOOTING PROCEDURES – CONTINUED**NOTE**

When [Warning 3671: Winterization Kit Low Voltage Warning] appears on DCS screen, winterization kit is draining the batteries or DCS is reading the signal as a battery drain signal. The batteries are below 20 VDC when [Warning 3671: Winterization Kit Low Voltage Warning] appears on DCS screen.

MALFUNCTION

Battery connections are loose or batteries are insufficiently charged.

CORRECTIVE ACTION**WARNING**

Do not damage batteries. Storage batteries are filled with a liquid acid that can leak from sealed battery when case is broken. Contact with acidic liquid can burn skin and eyes. Wear safety goggles and chemical gloves and avoid acid splash while handling damaged batteries. Do not move batteries by terminals. Failure to comply may cause injury or death to personnel or damage to equipment.

- STEP 1. Check for corroded or loose battery connections. Clean/replace corroded battery connections and tighten loose battery connections as required (WP 0036, Remove/Install Batteries).
- STEP 2. Check DCS voltage meter for a reading less than 20 VDC indicating battery voltage is low (TM 9-6115-749-10).
- STEP 3. If battery voltage is not low, proceed to next malfunction.
- STEP 4. If battery voltage is low, use a multimeter selected for the appropriate VDC scale to measure the voltage of each battery at the battery terminals (WP 0093, General Maintenance and WP 0036, Remove/Install Batteries).
- STEP 5. Charge batteries, start engine utilizing the NATO slave receptacle and an outside 24 VDC power source, or replace batteries as required (WP 0036, Remove/Install Batteries and WP 0093, General Maintenance).
- STEP 6. Start generator set (TM 9-6115-749-10) and observe DCS [Battery] [Adc] indicator to ensure battery-charging alternator is charging batteries properly (TM 9-6115-749-10). Test battery-charging alternator if batteries are not charging properly and replace as required (WP 0075, Remove/Install Battery-Charging Alternator Assembly).
- STEP 7. If symptom continues, proceed to next malfunction.

MALFUNCTION

Winterization kit wiring or DCS failure.

CORRECTIVE ACTION

Troubleshoot IAW Winterization kit wiring or DCS failure malfunction under [Warning 3663: Winterization Kit Failure to Heat] displayed on DCS screen symptom.

SYMPTOM

Winterization kit fails to turn off.

TROUBLESHOOTING PROCEDURES – CONTINUED**MALFUNCTION**

Defective flame or heat sensor.

CORRECTIVE ACTION

Troubleshoot IAW Winterization Kit Activates Under Usual Operating Conditions symptom.

SYMPTOM

Winterization kit activates under usual operating conditions.

MALFUNCTION

Defective temperature sensor.

CORRECTIVE ACTION

- STEP 1. Test temperature sensor IAW [Warning 144: Coolant Temp Sensor OOR High] displayed on DCS screen symptom (WP 0008, Electrical System Troubleshooting with a DCS Code).
- STEP 2. If symptom continues, troubleshoot IAW Winterization kit wiring or DCS failure malfunction under [Warning 3663: Winterization Kit Failure to Heat] displayed on DCS screen symptom.

END OF WORK PACKAGE

CHAPTER 3

FIELD MAINTENANCE INSTRUCTIONS
FOR
AMMPS 5 KW GENERATOR SET

FIELD MAINTENANCE
SERVICE UPON RECEIPT

INITIAL SETUP:**Test Equipment**

Load Bank (WP 0162, Table 2, Item 2)

Personnel Required

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Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

References

A-A-52557
 DA Form 2258
 DA PAM 750-8
 MIL-PRF-2104H
 MIL-PRF-22191
 MIL-PRF-46167D NOTICE 1
 MIL-STD-129P w/Change 4
 DD Form 361
 WP 0015, Field PMCS Introduction
 WP 0016, Field PMCS, Including Lubrication Instructions
 WP 0021, Service Cooling System
 WP 0036, Remove/Install Batteries
 WP 0039, Service Fuel System
 WP 0066, Service Lubrication System
 WP 0076, Remove/Install Battery-Charging Alternator Belt

Materials/Parts

Belt, V (WP 0132, Item 8)
 Filter, engine oil (WP 0124, Item 5)
 Antifreeze, ethylene glycol (WP 0163, Table 1, Item 2)
 Bag, barrier (WP 0163, Table 1, Item 3)
 Cap set, protective (WP 0163, Table 1, Item 8)
 Cleaning compound, engine cooling system (WP 0163, Table 1, Item 9)
 Detergent, general purpose (WP 0163, Table 1, Item 16)
 Distilled water (WP 0163, Table 1, Item 17)
 Fuel, diesel (WP 0163, Table 1, Item 18)
 Fuel, diesel (WP 0163, Table 1, Item 19)
 Grease, electrically conductive (WP 0163, Table 1, Item 20)
 Lubricating oil, engine (WP 0163, Table 1, Item 23)
 Lubricating oil, engine (WP 0163, Table 1, Item 24)
 Lubricating oil, engine (WP 0163, Table 1, Item 25)
 Rag, wiping (WP 0163, Table 1, Item 31)
 Sealant (WP 0163, Table 1, Item 32)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool

WARNING

Exhaust discharge contains deadly gases, including carbon monoxide. Exhaust gases are most dangerous in places with poor ventilation. Do not operate generator set in an enclosed area unless exhaust discharge is properly vented. Failure to comply may cause injury or death to personnel.

WARNING

Engine coolant is toxic to eyes and poisonous if ingested. Eye protection is required when working with engine coolant. Avoid repeated or prolonged contact. Failure to comply may cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

WARNING

High voltage is produced when generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Do not ground yourself in standing water. Never attempt to connect or disconnect load cables while the generator sets are running. Failure to comply may cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Do not contact output cables when operating this generator set. Failure to comply may cause injury or death to personnel.

WARNING

The right-hand battery negative lead that connects directly to the grounding stud must be disconnected prior to disconnecting or removing batteries. Follow procedural steps in exact order given for removal and installation. Failure to comply may cause injury or death to personnel.

WARNING

Batteries give off combustible gas. Do not smoke or use open flame when performing maintenance. Failure to comply may cause injury or death to personnel and damage to equipment.

WARNING

Battery acid can cause burns to skin and cause eye injury. Wear safety goggles and chemical gloves and avoid acid splash while working on the batteries. Failure to comply may cause injury or death to personnel.

WARNING

Do not damage batteries. Storage batteries are filled with a liquid acid that can leak from sealed battery when case is broken. Contact with acidic liquid can burn skin and eyes. Wear safety goggles and chemical gloves and avoid acid splash while handling damaged batteries. Do not move batteries by terminals. Failure to comply may cause injury or death to personnel or damage to equipment.

WARNING

Lifting batteries may cause back strain. Ensure proper lifting techniques are used when lifting batteries. Failure to comply may cause injury or death to personnel.

WARNING

Fuel is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash skin and change clothing promptly if in contact with fuel. Failure to comply may cause injury or death to personnel.

WARNING

Fuels used in the generator set are combustible. Ensure fuel source grounding strap is connected to unit fuel fill grounding stud (fuel fill static ground). When filling the fuel tank, maintain metal-to-metal contact between filler nozzle and fuel tank opening to eliminate **ESD**. Fire and possible explosion can result. Failure to comply may cause injury or death to personnel.

WARNING

Fuels used in the generator set are combustible. Do not smoke or use open fire when performing maintenance. Fire and possible explosion may result. Failure to comply may cause injury or death to personnel and damage to equipment.

WARNING

Hot exhaust gases can ignite combustible materials. Allow room for safe discharge of hot gases. Failure to comply may cause injury or death to personnel.

WARNING

Wear heat resistant gloves and avoid contacting hot metal surfaces with hands and exposed skin after components have been heated. Wear additional protective clothing as required. Failure to comply may cause injury or death to personnel.

WARNING

Comply with all lifting requirements. Observe the decals on equipment and parts that identify the weight and determine if assistance is needed. Maximum lift is 37 lb (16.8 kg) for one person, 74 lb (33.6 kg) for two persons, and 101 lb (45.8 kg) for three persons. Failure to comply may cause injury or death to personnel.

WARNING

When lifting generator set, use lifting equipment with minimum lifting capacity of 1,000 lb (453.6 kg). Do not stand or put arms, legs, or any body part under hoisted load. Do not permit generator set to swing. Failure to comply may cause injury or death to personnel.

WARNING

Hearing protection is required during maintenance or repair with engine running. Failure to comply can cause hearing loss.

CAUTION

While filling the coolant, air must be vented from the engine coolant passages. Vent air by opening pressure release valve and pouring slowly into the filler opening. Failure to comply may cause damage to equipment.

CAUTION

Be sure to close radiator cap securely to avoid coolant leakage. Engine may overheat if cap is loose. Failure to comply may cause damage to equipment.

CAUTION

Operating generator set with doors open or with panels removed for an extended length of time will cause engine to overheat. Do not operate generator with doors open or panels removed for longer than necessary to complete your task. Monitor DCS temperature indicator to prevent engine overheating. Failure to comply will cause damage to equipment.

CAUTION

Do not move or lift batteries by the terminal studs. Failure to comply will cause damage to equipment.

NOTE

Capture spilled fuel/coolant and dispose of IAW local SOP.

This WP provides information and guidance for service upon receipt of the AMMPS 5 kW generator set. These procedures ensure the AMMPS unit is adequately inspected, serviced, sited, and operationally tested before being subjected to use.

SITING

See the siting requirements contained in TM 9-6115-749-10.

END OF TASK**SERVICE UPON RECEIPT OF MATERIEL****Unpacking****NOTE**

The generator set should take approximately 0.5 hours to unpack.

1. Inspect all packaging for damage incurred during transit. See Checking Equipment and Table 1.
2. Remove 14 lag bolts (Figure 1, Items 4 and 20) and washers (Figure 1, Items 3 and 21) securing top (Figure 1, Item 1) of plywood box.
3. Remove top (Figure 1, Item 1) of plywood box.
4. Remove seven lag bolts (Figure 1, Items 16 and 18) and washers (Figure 1, Items 15 and 19) from front end (Figure 1, Item 17) of plywood box.
5. Remove front end (Figure 1, Item 17) of plywood box and set aside.
6. Repeat for inspection end (Figure 1, Item 2) of plywood box being sure to remove seven lag bolts (Figure 1, Item 16) and washers (Figure 1, Item 15) securing side panels.

SERVICE UPON RECEIPT OF MATERIEL – CONTINUED

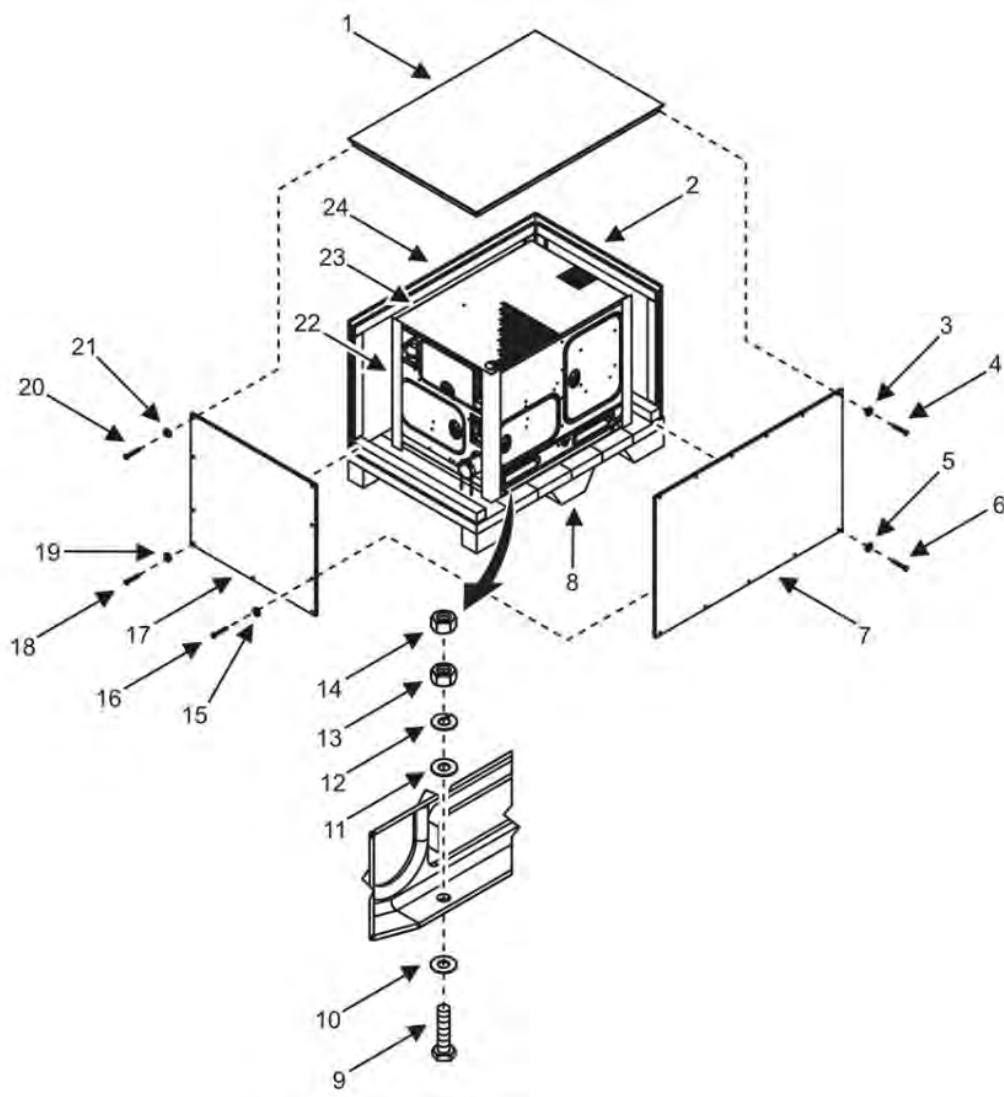


Figure 1. Generator Set Unpacking.

7. Remove inspection end (Figure 1, Item 2) of plywood box and set aside.
8. Remove five lag bolts (Figure 1, Item 6) and washers (Figure 1, Item 5) from right-side (Figure 1, Item 7) of plywood box.
9. Remove right-side (Figure 1, Item 7) of plywood box and set aside.
10. Repeat for left-side (Figure 1, Item 24) of plywood box. Remove left-side (Figure 1, Item 24) of plywood box and set aside.
11. Check humidity gauge at rear side of generator set (Figure 1, Item 23) for color change and record reading.
12. Report any abnormal reading IAW Checking Equipment task, Step 2.
13. Remove polyethylene bag (not pictured) and paperboard corner protectors (Figure 1, Item 22).

SERVICE UPON RECEIPT OF MATERIEL – CONTINUED

14. Remove eight nuts (Figure 1, Items 13 and 14), four lockwashers (Figure 1, Item 12), and four washers (Figure 1, Item 11) securing generator set (Figure 1, Item 23) to bolts (Figure 1, Item 9) on wooden pallet (Figure 1, Item 8).
15. Lift generator set (Figure 1, Item 23) clear of wooden pallet (Figure 1, Item 8) using a suitable lifting device.
16. Remove four bolts (Figure 1, Item 9) and four washers (Figure 1, Item 10) from underneath pallet.
17. Stack all side and end panels on wooden pallet (Figure 1, Item 8) and save for reuse.
18. Package all lags, bolts, and nuts and store with wooden pallet (Figure 1, Item 8) for reuse.
19. Dispose of all packaging materials for the 5 kW generator set IAW local SOP.
20. Store wooden pallet, sides, and hardware for the 5 kW generator set IAW local SOP.

END OF TASK**Packing.**

1. Ensure oil level is full and fill as required (WP 0066, Service Lubrication System).
2. Service cooling system (WP 0021, Service Cooling System).
3. Run engine for at least 5 min to preserve cooling system (TM 9-6115-749-10).
4. Shut down generator set and allow engine to cool.
5. Prepare generator set IAW Preparation for Movement WP (TM 9-6115-749-10).
6. Ensure auxiliary fuel lines and paralleling cables are stored in the proper storage box within the generator set (TM 9-6115-749-10).
7. Ensure technical publications are sealed into plastic bag IAW MIL-PRF-22191, Performance Specification, Barrier Materials, Transparent, Flexible, Heat-Sealable and stored in document box (TM 9-6115-749-10).
8. Ensure one copy of DA Form 2258, Depreservation Guide for Vehicles and Equipment is stored in plastic bag in the document box IAW MIL-PRF-22191.
9. Attach one copy of DA Form 2258, Depreservation Guide for Vehicles and Equipment stored in plastic bag IAW MIL-PRF-22191 to outside of generator set.
10. Position wooden pallet (Figure 1, Item 8) on a level surface.
11. Position generator set (Figure 1, Item 23) on wooden pallet (Figure 1, Item 8) using a suitable lifting device.
12. Secure generator set (Figure 1, Item 23) to wooden pallet (Figure 1, Item 8) with one washer (Figure 1, Item 11), one lockwasher (Figure 1, Item 12), and two nuts (Figure 1, Item 13 and 14) on one bolt (Figure 1, Item 9) with washer (Figure 1, Item 10).
13. Repeat for three other bolts and hardware securing generator set (Figure 1, Item 23) to wooden pallet (Figure 1, Item 8).
14. Position right-side (Figure 1, Item 7) of plywood box on wooden pallet (Figure 1, Item 8) using five lag bolts (Figure 1, Item 6) and washers (Figure 1, Item 5) to secure to wooden pallet (Figure 1, Item 8).
15. Repeat for left-side (Figure 1, Item 24) of plywood box.
16. Position front end (Figure 1, Item 17) of plywood box on wooden pallet (Figure 1, Item 8) using three lags (Figure 1, Item 18) and washers (Figure 1, Item 15).
17. Install two lags (Figure 1, Item 16) and washers (Figure 1, Item 15) to each side of front end (Figure 1, Item 17) of plywood box to secure to left- and right-sides (Figure 1, Items 24 and 7).
18. Position inspection end (Figure 1, Item 2) of plywood box on wooden pallet (Figure 1, Item 8) and secure with same number of lags and washers (Figure 1, Items 15, 16, 18, 19, 20, and 21) used on front end (Figure 1, Item 17) of plywood box.

SERVICE UPON RECEIPT OF MATERIEL – CONTINUED

19. Install top (Figure 1, Item 1) of plywood box.
20. Install two lags (Figure 1, Item 20) and washers (Figure 1, Item 21) to top of each end (Figure 1, Items 2 and 17) of plywood box and six lags (Figure 1, Item 4) and washers (Figure 1, Item 3) to top of each side (Figure 1, Items 7 and 24) of plywood box.
21. Inspect to ensure box is adequately sealed and correctly assembled.
22. Label box IAW MIL-STD-129P w/Change 4 as required.

END OF TASK**SERVICE UPON RECEIPT OF MATERIEL****Checking Equipment****Table 1. Inspection Criteria for Packaging.**

COMPONENT	ACCEPTABLE	REPARABLE	NONREPARABLE
Wooden Boxes and Crates			
Hardware	Operative and tight. Lag screws, nuts, washers.	Inoperative or loose. Lag screws, nuts, washers.	None.
Ends	Free from damage.	Broken or missing portions.	Damage that requires disassembly of box.
Wood	Splits less than 3 in (7.62 cm) long, no closer than 1 in (2.54 cm) to edge of board or adjoining split. The board must be secured by at least one lag screw on each side of the split when it extends to the end of the board.	Splits more than 3 in (7.62 cm) but no closer than 1 in (2.54 cm) to edge of board or adjoining split or 1/2 in (1.27 cm) wide that can be repaired by use of corrugated fasteners.	Splits closer than 1 in (2.54 cm) to edge of board or adjoining split or over 1/2 in (1.27 cm) wide.

1. Ensure all authorized components, materials, and accessories are present upon receipt of the AMMPS 5 kW generator set by checking the equipment against the packing slips to see if the shipment is complete.
2. Check to see if the equipment has been modified and report all discrepancies IAW applicable service instructions (for Army instructions, see DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual).
3. Inspect the equipment for any exterior or interior damage incurred during shipment.
4. Report any damaged item(s) IAW the instructions in the warranty technical bulletin and note the damage on DD Form 361, Transportation Discrepancy Report (TDR).
5. Check that all packing materials have been removed and are in "Acceptable" condition. See Table 1.
6. Inspect generator set assemblies, subassemblies, and accessories for any internal or external shipping damage.
7. Check generator set identification plates for positive identification (TM 9-6115-749-10).
8. Inspect generator set for loose or missing mounting hardware or damaged or missing parts.
9. Open left-side door and inspect batteries for damage.

SERVICE UPON RECEIPT OF MATERIEL – CONTINUED

10. Check battery cables for damage.
11. Open output terminal door and check output terminals and cover for damage.
12. Check output terminal board for loose wires or damage.
13. Open DCS cover and visually check DCS for damage.
14. Check air cleaner assembly and exhaust opening for obstruction or damage.
15. Check battery-charging alternator belt for proper adjustment (WP 0076, Remove/Install Battery-Charging Alternator Belt).
16. Open grounding rod compartment door on front panel and ensure items are complete and free of damage.
17. Open right-side door and ensure auxiliary fuel hose is in place and free of damage.

END OF TASK**INSTALLATION INSTRUCTIONS****Batteries**

For battery service, see WP 0036, Remove/Install Batteries.

END OF TASK**Radiator****NOTE**

The AMMPS 5 kW generator set ships with coolant.

For radiator service, see WP 0021, Service Cooling System.

END OF TASK**Fuel Tank****NOTE**

The AMMPS 5 kW generator set ships without fuel.

1. Check that fuel drain valve (WP 0039, Service Fuel System) is closed.
2. Fill generator set fuel tank (TM 9-6115-749-10) with fuel type specified in Table 2. Fuel capacity is 3.80 gal (14.38 L).

Table 2. Fuel.

AMBIENT TEMPERATURE	FUEL
-50 to 135 °F (-46 to 57.2 °C)	JP8
25 to 135 °F (-3.9 to 57.2 °C)	A-A-52557 ^a
	GR 2-D
0 to +20 °F	A-A-52557

INSTALLATION INSTRUCTIONS – CONTINUED**Table 2. Fuel. – Continued**

AMBIENT TEMPERATURE	FUEL
(-17.7 to -6.7 °C)	GR 1-D

^aFuel Oil, Diesel; for Posts, Camps, and Stations.

END OF TASK**Installation of Ground Rod**

Ground the AMMPS 5 kW generator set IAW TM 9-6115-749-10.

END OF TASK**PRELIMINARY SERVICING OF EQUIPMENT****Lubricating Oil****NOTE**

The AMMPS 5 kW generator set ships with lubricant.

1. Remove dipstick to check for presence of engine oil (WP 0066, Service Lubrication System).
2. Fill engine with proper engine oil IAW Table 3 to FULL mark on dipstick (WP 0066, Service Lubrication System). Lubrication system capacity is 3.9 qt (3.7 L).

Table 3. Lubricating Oil.

AMBIENT TEMPERATURE	SPECIFICATION	CAPACITY	EXPECTED TEMPERATURES
5 to 135 °F (-15 to 57 °C)	MIL-PRF-2104H ^a OE/HDO 15W40	Crankcase and engine 3.9 qt (3.7 L) with filter	Not Applicable
-15 to 5 °F (-26 to -15 °C)	MIL-PRF-2104H OE/HDO-10		
-50 to 40 °F (-46 to 4 °C)	MIL-PRF-46167D NOTICE 1 ^b		

^aPerformance Specification, Lubrication Oil, Internal Combustion Engine, Combat/Tactical Service.

^bPerformance Specification, Lubrication Oil, Internal Combustion Engine, Arctic.

END OF TASK**PRELIMINARY CHECKS AND ADJUSTMENT OF EQUIPMENT**

Checks and adjustments shall be made on all newly-installed AMMPS 5 kW generator sets. Information on the location of items such as controls and components is located in individual WPs. Before any equipment is put into use, checks are required to ensure proper operation of the equipment.

PRELIMINARY CHECKS AND ADJUSTMENT OF EQUIPMENT – CONTINUED**NOTE**

To conduct some of these preliminary checks and adjustments, it is necessary to run the AMMPS 5 kW generator set under load.

1. Perform before PMCS (TM 9-6115-749-10).
2. Inspect panels, access doors, and plates.
3. Check for grounding, including earth ground circuits and earth conditioning for conduction, as well as a check of the grounding circuit for negligible resistance.
4. Check for firm seating and connection of all plug-in parts, mating connectors, jacks, and plugs.
5. Check cable and wiring harness routing, dressing, and fastening.
6. Check operation of safety interlocks and switches.
7. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
8. Start unit and generate electrical load at a frequency of 50 Hz and 60 Hz for 04-1030 and 400 Hz for 04-1031 (TM 9-6115-749-10).
9. Turn engine control switch to OFF (TM 9-6115-749-10) when generator set has reached normal operating temperature, voltage, and frequency.
10. Check content and operation of liquid cooling systems (WP 0021, Service Cooling System).
11. Complete lubricants and CPC procedures (WP 0016, Field PMCS, Including Lubrication Instructions).
12. Check terminal connections (TM 9-6115-749-10).
13. Perform after PMCS (TM 9-6115-749-10) on AMMPS 5 kW generator set.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

FIELD PMCS INTRODUCTION

INITIAL SETUP:

Not Applicable

INTRODUCTION

This work package contains information you will need to perform field maintenance PMCS. Steps are included to help you perform these procedures easily and quickly. PMCS consist of scheduled maintenance items used to make sure the AMMPS are ready for operation at all times. Inspect the system regularly and carefully so you can find, correct, and prevent any defects.

GENERAL

PMCS are performed to keep the equipment in operating condition. The checks are used to find, correct, or report problems. Pay attention to warning and caution statements. A warning indicates the possibility of injury or death to personnel. A caution means the potential for equipment damage.

Intervals are given in operating hours, calendar intervals, or in both operating hours and calendar intervals. Check or service should be performed using interval that occurs first when both operating hours and calendar intervals are given.

- First 50 hours.
- Every 250 hours.
- Every 500 hours.
- Every 1,000 hours.
- Every 1,500 hours.
- Every 250 hours or every 3 months.
- Every 500 hours or every 6 months.
- Every 1,500 hours or every 1 year.
- Every 1,500 hours or every 2 years.
- Under harsh environmental conditions, PMCS should be conducted more frequently.

EXPLANATION OF THE COLUMNS FOUND IN THE PMCS TABLE

Column (1) - Item No. The item number lists the checks and services in the order they are to be completed. This column will be used as a source of item for the TM Number Column on DA Form 2258, Equipment Inspection and Maintenance Worksheet, or DA Form 5988E (electronic version), Equipment Inspection and Maintenance Worksheet, in recording the result of the PMCS.

Column (2) - Interval. References when the PMCS should be performed.

Column (3) - Item to be Checked or Serviced. Identifies the portion of the system to be inspected.

Column (4) - Procedure. Provides the procedures for performing the checks.

INTRODUCTION – CONTINUED

Column (5) - Equipment Is Not Ready/Available If. Contains the criteria that will render the system incapable of performing its primary mission. If the system does not perform as required, refer to Chapter 2, Field Maintenance Troubleshooting (WP 0004, Field Troubleshooting Index). If equipment appears to be malfunctioning and the problem cannot be fixed, immediately report it to your supervisor and report it on DA Form 2404, Equipment Inspection and Maintenance Worksheet.

Corrosion Prevention and Control

CPC of Army materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent future problems.

Corrosion specifically occurs with metals. It is an electrochemical process that causes the degradation of metals. It is commonly caused by exposure to moisture, acids, bases, or salts. An example is the rusting of iron. Corrosion damage in metals can be seen, depending on the metal, as tarnishing, pitting, fogging, surface residue, and/or cracking.

Plastics, composites, and rubbers can also degrade. Degradation is caused by thermal (heat), oxidation (oxygen), salvation (solvents), or photolytic (light, typically UV) processes. The most common exposures are excessive heat or light. Damage from these processes will appear as cracking, softening, swelling, and/or breaking.

SF 368, Product Quality Deficiency Report (PQDR) should be submitted to the address specified in DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual.

For aircraft TMs, this information shall include a reference to TM 1-1500-344-23, volumes 1 through 4 (Cleaning and Corrosion Control).

Rust Definition

Rust is defined as any various scaly or powdery reddish-brown or reddish-yellow materials that form on iron and iron-coated materials in the presence of moisture, deteriorating as a result of disuse or neglect.

Deterioration Definition

Deterioration is defined as any condition that causes material to be defective or lessens the quality or value of the material.

Cracking Definition

Cracking is defined as when material is found to be split or broken, either completely or partially.

INSPECTION

Look for signs of problems or troubles. Most problems can be detected by sight, touch, smell, or sound. Be alert when around the AMMPS generator set.

Inspect to ensure that all components are in good condition. Are they correctly assembled, stowed, or secured? Are any components worn, corroded, or rusty? Correct any problems found or notify your immediate supervisor.

There are common items that should be checked. These include the following:

Bolts, clamps, screws, and nuts: Continuously inspect for looseness. Inspect for chipped paint, bare metal, rust, or corrosion around bolt and screw heads and nuts. Replace as necessary. Tighten hardware as required.

Welds: Some components of the AMMPS generator set are welded. To inspect welds, look for chipped paint, rust, corrosion, or gaps. When these conditions are found, repair or replace as required.

INTRODUCTION – CONTINUED**WARNING**

NATO slave receptacle is electrically live at all times and is not protected by a fuse. Disconnecting the main DC circuit breaker does not ensure the circuit is dead. This circuit is only dead when the batteries are fully disconnected. Disconnect both batteries before performing maintenance on the slave receptacle. Failure to comply may cause injury or death to personnel.

WARNING

Metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry and do not wear loose clothing when working on equipment. Failure to comply may cause injury or death to personnel.

WARNING

High voltage is produced when generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Do not ground yourself in standing water. Never attempt to connect or disconnect load cables while the generator sets are running. Failure to comply may cause injury or death to personnel.

Electrical wires, connectors, and harnesses: Tighten loose connections. Inspect for cracked or broken insulation, bare wires, and broken connectors. If any are found, repair or replace as required.

Hoses and fluid lines: Inspect for wear, damage, and leaks. Ensure clamps and fittings are tight. Wet spots indicate a leak. A stain by a fitting or connector can also mean a leak. When this is found, repair or replace as required.

CLEANING AND LUBRICATION

Proper cleaning and lubrication can aid in avoiding possible problems or trouble. Make it a habit to do the following:

CAUTION

Follow all cleaning and lubrication instructions carefully. Failure to comply may cause damage to equipment.

Under harsh environmental conditions, conduct PMCS more frequently.

Use only the recommended cleaning solutions listed in MIL-PRF-680, MIL-PRF-29608, and SAE-AMS-C-29602.

Clean the lenses and screens of the DCS using the proper electronic cleaning cloth found in the Expendable and Durable Items List (WP 0163, Expendable and Durable Items List).

Oil Filters

Oil filters shall be serviced/cleaned/changed, as applicable, when:

They are known to be contaminated or clogged, or at prescribed hard time intervals.

AOAP Sampling Intervals

This generator set is not enrolled in the Army Oil Analysis Program. HARDTIME INTERVALS APPLY.

Warranty Hard Time Statement

For equipment under manufacturer's warranty, hardtime oil service intervals shall be followed. Intervals shall be shortened if lubricants are known to be contaminated or if operation is under adverse conditions (such as longer-than-usual operating hours, extended idling periods, extreme dust).

INTRODUCTION – CONTINUED**FLUID LEAKAGE****WARNING**

Do not operate generator set if any fuel leaks are present. Fuel is combustible. Always perform PMCS before operation. Failure to comply may cause injury or death to personnel.

WARNING

Fuel is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash exposed skin and change soaked clothing promptly if exposed to fuel. Failure to comply may cause injury or death to personnel.

CAUTION

When operating with Class I or II leaks, continue to check fluid level as required by PMCS. Class III leaks should be noted and repaired immediately. Any Class I, II, or III fuel leak requires equipment shut down. Failure to comply may cause damage to equipment.

It is necessary for you to know how fluid leakage affects the status of the AMMPS 5 kW generator sets. Following are types/classes of leakage you need to know to be able to determine the status of the AMMPS 5 kW generator sets. Learn these leakage definitions and remember, when in doubt, notify your supervisor. Equipment operation is allowed with minor leakage (Class I or II). Consideration must be given to fluid capacity in the item/system being checked/inspected. When in doubt, notify your supervisor.

Any Class I, II, or III fuel leak requires equipment shut down.

When operating with Class I or II leaks, continue to check fluid levels as required in the PMCS.

Class III leaks should be reported immediately to your supervisor.

- (1) Class I: Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.
- (2) Class II: Leakage of fluid great enough to form drops but not enough to cause drops to drip from item being checked/inspected.
- (3) Class III: Leakage of fluid great enough to form drops that fall from item being checked/inspected.

END OF WORK PACKAGE

FIELD MAINTENANCE

FIELD PMCS, INCLUDING LUBRICATION INSTRUCTIONS

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Personnel Required

91D (1)

Materials/Parts

Belt, V (WP 0132, Item 8)
 Element, air filter (WP 0106, Item 2)
 Filter, element (WP 0111, Item 7)
 Filter, engine oil (WP 0124, Item 5)
 Gasket (3) (WP 0127, Item 10)
 Antifreeze, ethylene glycol (WP 0163, Table 1, Item 2)
 Brush, wire, scratch, brass (WP 0163, Table 1, Item 7)
 Cap set, protective (WP 0163, Table 1, Item 8)
 Cleaning compound, engine cooling system (WP 0163, Table 1, Item 9)
 Cleaning compound, solvent (WP 0163, Table 1, Item 10)
 Cloth, cleaning, electronics (WP 0163, Table 1, Item 12)
 Distilled water (WP 0163, Table 1, Item 17)
 Fuel, diesel (WP 0163, Table 1, Item 19)
 Grease, electrically conductive (WP 0163, Table 1, Item 20)
 Lubricating oil, engine (WP 0163, Table 1, Item 23)
 Pan, drain (WP 0163, Table 1, Item 28)
 Penetrating oil (WP 0163, Table 1, Item 29)
 Rag, wiping (WP 0163, Table 1, Item 31)
 Sealant (WP 0163, Table 1, Item 32)

References

WP 0018, Repair DCS
 WP 0020, Service Air Cleaner Assembly
 WP 0021, Service Cooling System
 WP 0025, Remove/Install Winterization Kit Components
 WP 0039, Service Fuel System
 WP 0043, Replace Fuel Filter/Water Separator Element
 WP 0061, Remove/Install Relay Panel
 WP 0066, Service Lubrication System
 WP 0069, Remove/Install Fuel Injector
 WP 0076, Remove/Install Battery-Charging Alternator Belt
 WP 0082, Remove/Install Valve Cover
 WP 0083, Check/Adjust Engine Valves
 WP 0087, Lubrication Instructions

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool

Table 1. Field Preventive Maintenance Checks and Services.

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
WARNING Metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry and do not wear loose clothing when working on equipment. Failure to comply may cause injury or death to personnel.				

Table 1. Field Preventive Maintenance Checks and Services. – Continued

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
WARNING While inspecting the operation of the generator set, do not inadvertently reach into the generator set. Failure to comply can cause injury or death to personnel. WARNING Flying debris or material may enter eyes or strike the face. Wear appropriate eye/face protection while performing maintenance tasks. Failure to comply may cause injury or death to personnel. WARNING Hearing protection is required during maintenance or repair with engine running. Failure to comply can cause hearing loss. WARNING Fuels used in the generator set are combustible. Ensure fuel source grounding strap is connected to unit fuel fill grounding stud (fuel fill static ground). When filling the fuel tank, maintain metal-to-metal contact between filler nozzle and fuel tank opening to eliminate ESD. Fire and possible explosion can result. Failure to comply may cause injury or death to personnel. WARNING Do not operate generator set if any fuel leaks are present. Fuel is combustible. Always perform PMCS before operation. Failure to comply may cause injury or death to personnel. WARNING Never inject fuel near a fire source. Atomized fuel is highly combustible. Fuel pressure is high enough to penetrate skin. Ensure that spray from the injector nozzle is directed away from all personnel. Direct contact with spray can cause skin cell destruction and blood poisoning. Skin and eye protection are required when working in contact with fuel. Failure to comply may cause injury or death to personnel and damage to equipment. WARNING Fuel is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash exposed skin and change soaked clothing promptly if exposed to fuel. Failure to comply may cause injury or death to personnel. WARNING Cooling system operates at high temperature and pressure. Contact with high-pressure steam and/or liquids can cause burns and scalding. Shut down generator set and allow system to cool before performing checks, services, and maintenance. Wear gloves, additional protective clothing, and goggles as required. Failure to comply may cause injury or death to personnel.				

Table 1. Field Preventive Maintenance Checks and Services. – Continued

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
WARNING Exhaust discharge contains deadly gases, including carbon monoxide. Exhaust gases are most dangerous in places with poor ventilation. Do not operate generator set in an enclosed area unless exhaust discharge is properly vented. Failure to comply may cause injury or death to personnel. WARNING When operating, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow engine to cool before checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel. WARNING Make sure engine control switch is only set to PRIME & RUN during fuel system checks. Failure to comply may cause injury or death to personnel. WARNING NATO slave receptacle is electrically live at all times and is not protected by a fuse. Disconnecting the main DC circuit breaker does not ensure the circuit is dead. This circuit is only dead when the batteries are fully disconnected. Disconnect both batteries before performing maintenance on the slave receptacle. Failure to comply may cause injury or death to personnel. WARNING High voltage is produced when generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Do not ground yourself in standing water. Never attempt to connect or disconnect load cables while the generator sets are running. Failure to comply may cause injury or death to personnel. WARNING High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel. WARNING Battery acid can cause burns to skin and cause eye injury. Wear safety goggles and chemical gloves and avoid acid splash while working on the batteries. Failure to comply may cause injury or death to personnel. WARNING Batteries give off combustible gas. Do not smoke or use open flame when performing maintenance. Failure to comply may cause injury or death to personnel and damage to equipment.				

Table 1. Field Preventive Maintenance Checks and Services. – Continued

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
WARNING A turbocharger may become very hot and requires more time to cool down than other parts of engine assembly. Shut down generator set and allow it to cool sufficiently before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel. CAUTION Operating generator set with doors open or with panels removed for an extended length of time will cause engine to overheat. Do not operate generator with doors open or panels removed for longer than necessary to complete your task. Monitor DCS temperature indicator to prevent engine overheating. Failure to comply will cause damage to equipment. CAUTION Be sure to close radiator cap securely to avoid coolant leakage. Engine may overheat if cap is loose. Failure to comply may cause damage to equipment. NOTE Ensure operator level PMCS (TM 9-6115-749-10) has been performed before performing field maintenance level PMCS. Perform PMCS task at the hour or calendar interval that comes first.				
1	50 h	Engine oil and filter	Perform first engine oil and filter change (WP 0066, Service Lubrication System).	
2	250 h	DCS	1. Ensure BATTLESHORT switch, engine control switch, and EMERGENCY STOP pushbutton operate as required (TM 9-6115-749-10). Repair or replace as required (WP 0018, Repair DCS). 2. Ensure screen is clean of dirt and excess debris by using an electronic cleaning cloth. Ensure DCS screen is not damaged or scratched.	Indicators are not working properly, switches fail to operate, or emergency stop does not work. Screen is damaged or scratched.
3	250 h	Relay panel	Check circuit breakers/relays for proper operation and reset or replace as required (WP 0061, Remove/Install Relay Panel).	Circuit breaker or relay missing or blown.
4	250 h or 3 months	GFCI receptacle	Ensure TEST and RESET functions on GFCI receptacle operate properly (TM 9-6115-749-10).	GFCI TEST or RESET function does not operate properly.

Table 1. Field Preventive Maintenance Checks and Services. – Continued

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
5	250 h or 3 months	Radiator	WARNING Cooling system operates at high temperature and pressure. Contact with high-pressure steam and/or liquids can cause burns and scalding. Shut down generator set and allow system to cool before performing checks, services, and maintenance. Wear gloves, additional protective clothing, and goggles as required. Failure to comply may cause injury or death to personnel. CAUTION Be sure to close radiator cap securely to avoid coolant leakage. Engine may overheat if cap is loose. Failure to comply may cause damage to equipment. Remove dirt or debris from radiator exterior surfaces that is preventing air flow.	Airflow through radiator is restricted.
6	250 h	Crankcase breather	Inspect breather tube for damage or clogging. Clean or replace as necessary (WP 0082, Remove/Install Valve Cover).	Crankcase breather tube is clogged.
7	500 h or 6 months	Fuel system	1. Replace main/auxiliary fuel strainers as required (WP 0039, Service Fuel System). 2. Drain 1 quart (qt) of fuel from fuel tank to remove sediment (WP 0039, Service Fuel System).	Strainer is damaged or clogged.
8	500 h or 6 months	Fuel filter/water separator	Replace fuel filter/water separator element (WP 0043, Remove/Install Fuel Filter/Water Separator Element).	
9	500 h or 6 months	Engine oil and filter	Change engine oil and oil filter (WP 0066, Service Lubrication System).	
10	500 h or 6 months	Voltage selection switch	Ensure voltage selection switch displays selected voltage on DCS screen when moved into desired position (TM 9-6115-749-10).	Voltage does not change when voltage selection switch is moved.

Table 1. Field Preventive Maintenance Checks and Services. – Continued

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
11	500 h or 6 months	Radiator cap	WARNING Cooling system operates at high temperature and pressure. Contact with high-pressure steam and/or liquids can cause burns and scalding. Shut down generator set and allow system to cool before performing checks, services, and maintenance. Wear gloves, additional protective clothing, and goggles as required. Failure to comply may cause injury or death to personnel. CAUTION Be sure to close radiator cap securely to avoid coolant leakage. Engine may overheat if cap is loose. Failure to comply may cause damage to equipment. 1. Inspect radiator cap for corrosion, torn or deteriorated seal, and obvious damage. 2. Test radiator cap for proper operation (WP 0021, Service Cooling System).	Radiator cap is damaged. Radiator cap fails to open at proper pressure.
12	500 h or 6 months	Air filter element	Replace air filter element (WP 0020, Service Air Cleaner Assembly).	Air filter element is restricted.
13	500 h	Battery-Charging alternator belt	Replace battery-charging alternator belt (WP 0076, Remove/Install Battery-Charging Alternator Belt).	Battery-Charging alternator belt is loose, damaged, or missing.
14	1,500 h or 1 year	Cooling system	1. Clean water jacket and radiator interior (WP 0021, Service Cooling System). 2. Drain, flush, and refill cooling system with new coolant (WP 0021, Service Cooling System).	
15	1,500 h or 2 years	Engine valves	Inspect and adjust engine valves (WP 0083, Check/Adjust Engine Valves).	
16	1,500 h	Fuel injectors	Clean, test, and replace fuel injectors as required (WP 0069, Remove/Install Fuel Injector).	Spray pattern is abnormal or pressure is incorrect.

Table 1. Field Preventive Maintenance Checks and Services. – Continued

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
17	1 year	Winterization kit (if applicable)	Test winterization kit and inspect for damage (WP 0025, Remove/Install Winterization Kit Components).	Winterization kit test fails or damage is found during inspection.

MANDATORY REPLACEMENT PARTS

Table 2. PMCS Mandatory Replacement Parts List.

ITEM NO.	PART NUMBER/ (CAGEC)	NATIONAL STOCK NUMBER (NSN)	NOMENCLATURE	QTY
500 H OR 6 MONTHS				
1	AF26116 (33457)	2940-01-588-3658	Filter, air cleaner element	1
2	HH150-32430 (0XWR1)	2940-01-573-9124	Filter, oil	1
3	R15S (55752)	2910-01-588-0924	Filter, element, fuel filter/water separator	1
500 H				
1	04-20042 (30554)	3030-01-588-0982	Belt, battery-charging alternator	1

LUBRICATION INSTRUCTIONS

Lubrication instructions for external components (i.e. hinges and latches) are contained in WP 0087, Lubrication Instructions.

END OF WORK PACKAGE

FIELD MAINTENANCE**REMOVE/INSTALL DCS**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Materials/Parts

Control box assembly (WP 0103, Item 3)
Washer, lock (WP 0103, Item 2)
Grease, electrically conductive (WP 0163, Table 1, Item 20)
Tag, marker (WP 0163, Table 1, Item 35)

Personnel Required

91D (1)
Assistant (1)

References

WP 0030, Remove/Install Rear Body Panel
WP 0033, Remove/Install Door
WP 0034, Repair Door
WP 0036, Remove/Install Batteries
WP 0093, General Maintenance

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)

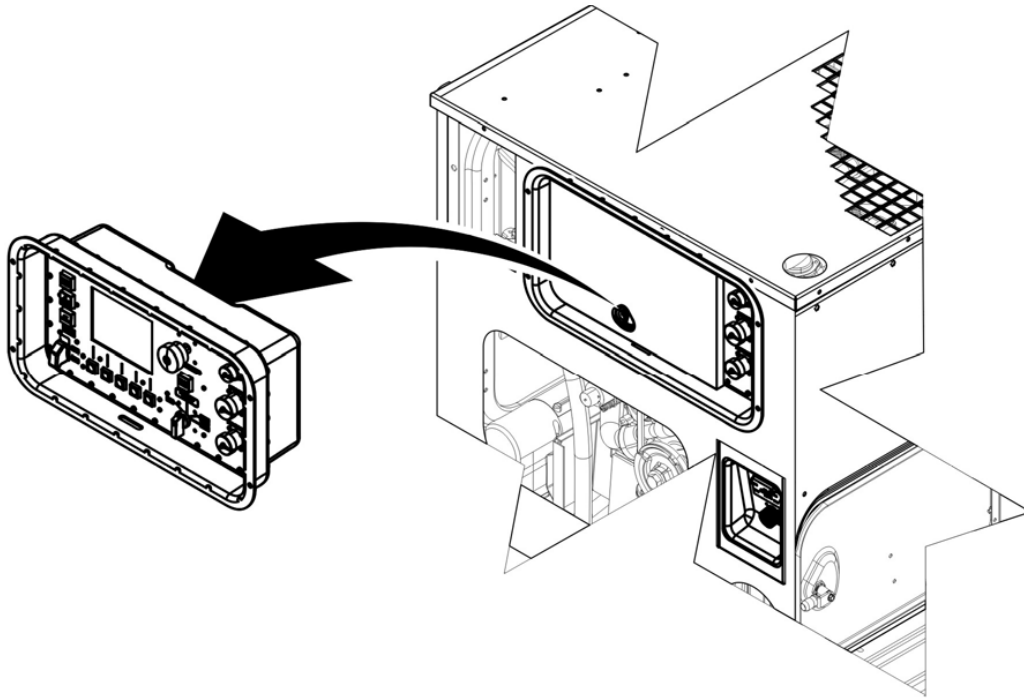
REMOVE/INSTALL DCS**WARNING**

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

Remove DCS**NOTE**

The DCS (Figure 1) has a cover that can be closed over the panel and latched. To improve clarity, illustrations in this document show the DCS unit without the cover.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate DCS (Figure 1) at rear of generator set.

REMOVE/INSTALL DCS – CONTINUED**Figure 1. DCS - Location.****CAUTION**

It is important to save the latest capture file from DCS being replaced (WP 0093, General Maintenance). Data can only be accessed using InPower AMMPS and a computer hard drive. If data is accessible, capture file can be used to overlay parameters and maintenance timers from the replaced DCS. If unable to access capture file data, maintenance timers will be reset and some parameters from replaced DCS will be lost. Use latest hard copy records to determine when maintenance actions are due. Failure to comply will cause damage to equipment.

CAUTION

It is important to save log data from DCS being replaced (WP 0093, General Maintenance). The maintenance, operational, and fault logs should be downloaded from the DCS with a Universal Serial Bus (USB) cable and saved to the hard drive of a computer. Maintenance, operational, and fault logs cannot be uploaded to the new DCS, but can be saved for reference. All logs will start over with a new DCS. If unable to access logs, use latest hard copy records to access operational, maintenance, and fault events. Failure to comply may cause damage to equipment.

3. Remove four hex socket head screws (Figure 2, Item 5) securing DCS unit (Figure 2, Item 1) to rear body panel (Figure 2, Item 2) and save screws for reuse.
4. Remove DCS unit (Figure 2, Item 1) from rear body panel (Figure 2, Item 2) to expose grounding strap (Figure 2, Item 4) attached to rear of DCS.
5. Tag and remove three electrical connectors (Figure 2, Item 3) from DCS unit (Figure 2, Item 1).

REMOVE/INSTALL DCS – CONTINUED

6. Remove bolt (Figure 3, Item 4) and lockwasher (Figure 3, Item 2) securing grounding strap (Figure 3, Item 3) to bottom of DCS unit (Figure 3, Item 1).
7. Discard lockwasher (Figure 3, Item 2) and set bolt (Figure 3, Item 4) aside for reuse.

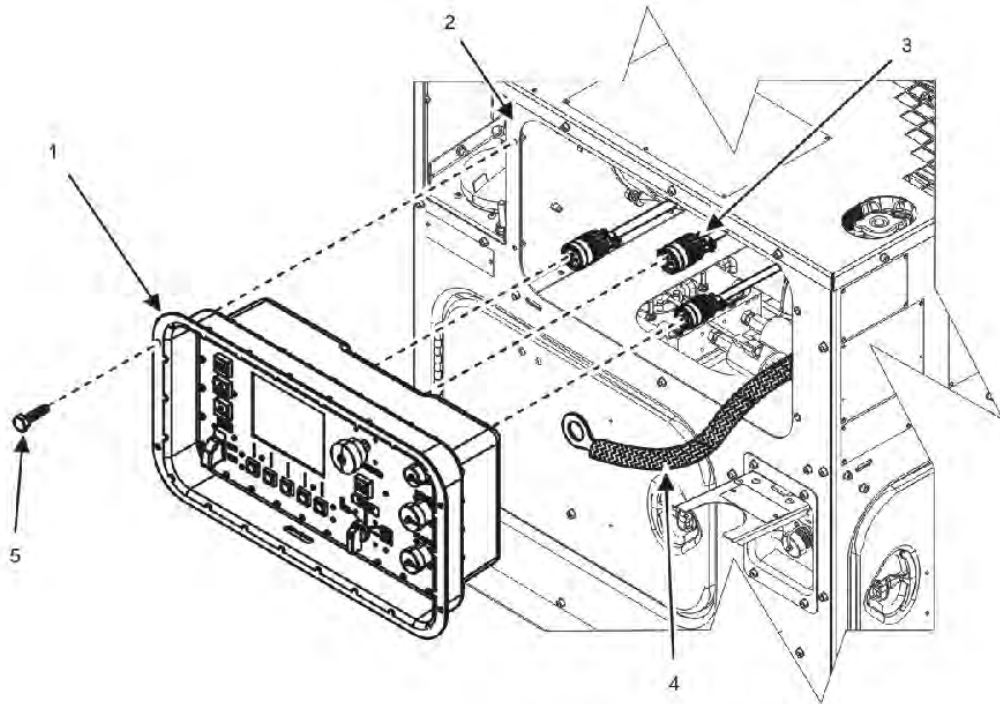


Figure 2. DCS Detail - Front.

8. Place DCS unit (Figure 3, Item 1) on a suitable work surface.

END OF TASK**Inspect DCS**

1. Inspect DCS door and door hinge for corrosion or damage and replace as required (WP 0033, Remove/Install Door or WP 0034, Repair Door).
2. Inspect DCS unit (Figure 3, Item 1) for corrosion or damage, and replace as required.
3. Inspect DCS unit (Figure 2, Item 1) front panel for broken switches or other damage. Repair or replace as required.
4. Inspect electrical connections (Figure 3, Item 6) in rear of DCS unit and in wiring harness (Figure 3, Item 5) for corrosion or other damage and replace unit if damage is found.
5. Inspect all mounting hardware for damage and replace as required.
6. Inspect DCS mounting area on rear body panel (Figure 2, Item 2) for damage or corrosion, and replace body panel as required (WP 0030, Remove/Install Rear Body Panel).

END OF TASK

REMOVE/INSTALL DCS – CONTINUED**Install DCS**

1. Position DCS unit (Figure 2, Item 1) on rear body panel (Figure 2, Item 2).

NOTE

Prior to installation, apply electrically conductive grease to the electrical connectors (Figure 2, Item 3) to prevent moisture from entering the connectors.

2. Attach DCS grounding strap (Figure 3, Item 3) with bolt (Figure 3, Item 4) and new lockwasher (Figure 3, Item 2).
3. Install DCS electrical connectors (Figure 3, Item 5) to rear of DCS unit (Figure 3, Item 1) according to location tags.
4. Remove tags from electrical connectors (Figure 3, Item 5).

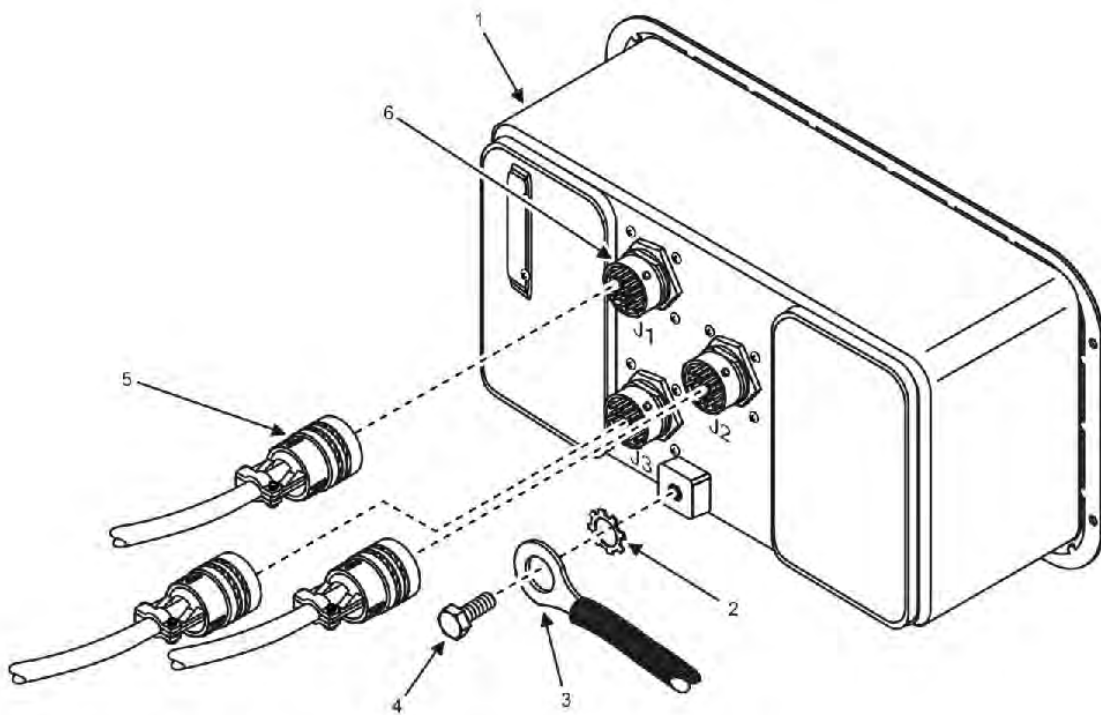


Figure 3. DCS Detail - Rear.

5. Install four hex socket head screws (Figure 2, Item 5) securing DCS unit (Figure 2, Item 1) to rear body panel (Figure 2, Item 2).
6. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
7. Close left-side door on generator set.
8. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
9. Start engine (TM 9-6115-749-10).
10. Reset control panel for proper operation. Bring coolant to normal operating temperature and then apply a 100% rated load for 30 min (TM 9-6115-749-10).
11. Repair as required.

REMOVE/INSTALL DCS – CONTINUED**END OF TASK****Adjust Governor Gain****NOTE**

[Governor Gain] has a default of 1 and a range of 0.1 Hz to 10 Hz. Adjusting to higher value increases output at higher ambient temperatures, but also increases instability and can cause hunting problems. A lower value decreases output at lower ambient temperatures, which can help with stability and hunting problems, but also decreases performance.

1. Ensure battery ground cable is installed (WP 0036, Remove/Install Batteries).
2. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
3. Reset [Governor Gain] option on [Adjustments] Screen 2 to default (TM 9-6115-749-10).
4. Start generator set (TM 9-6115-749-10).
5. Apply and remove load up to rated capacity. Observe frequency fluctuations.
6. Proceed to Step 7 if frequency fluctuations are observed or continue normal use of DCS if fluctuations are not observed.
7. Access [Governor Gain] option from [Adjustments] Screen 2 (TM 9-6115-749-10).
8. Adjust [Governor Gain] down or up 0.1 Hz at a time until output, stability, or hunting problem is resolved.
9. Observe frequency fluctuations and continue to adjust [Governor Gain] by applying and removing loads until output, stability, or hunting problem is resolved.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
REPAIR DCS

INITIAL SETUP:**Test Equipment**

Load Bank (WP 0162, Table 2, Item 2)

Personnel Required

91D (1)
Assistant (1)

Tools and Special Tools

Strap, Wrist, Electrostatic Discharge (WP 0162, Table 2, Item 25)
Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
Wrench, Torque, Dial, 1/4 in Drive, 30 in•lb (WP 0162, Table 2, Item 42)

References

WP 0009, Electrical System Troubleshooting without a DCS Code
WP 0017, Remove/Install DCS
WP 0028, Remove/Install Top Body Panel
WP 0036, Remove/Install Batteries

Materials/Parts

Ring, sealing (WP 0104, Item 10)
Switch, BATTLESORT (WP 0104, Item 9)
Switch, EMERGENCY STOP (WP 0104, Item 3)
Switch, engine control (WP 0104, Item 4)
Washer, lock (WP 0103, Item 2)
Pad, scouring (WP 0163, Table 1, Item 27)
Strap, tiedown (WP 0163, Table 1, Item 34)
Wire, tie (WP 0163, Table 1, Item 37)
Tag, marker (WP 0163, Table 1, Item 35)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool

Special Environmental Condition

Dry area with minimal dust

REPAIR DCS
WARNING

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

CAUTION

Due to the use of delicate electronic components, repair of the DCS must be performed in a clean environment. Failure to comply may cause damage to equipment.

CAUTION

Printed circuit boards/cards contain components that are sensitive to static electricity. Always wear an antistatic wrist strap connected to a metal surface to channel static electricity to ground when handling printed circuit boards/cards. Failure to comply may cause damage to equipment.

REPAIR DCS – CONTINUED**NOTE**

Repair of the DCS at field level is limited to replacement of the BATTLESORT switch, EMERGENCY STOP switch, and engine control switch. Failure of any other component inside the DCS requires DCS replacement (WP 0017, Remove/Install DCS).

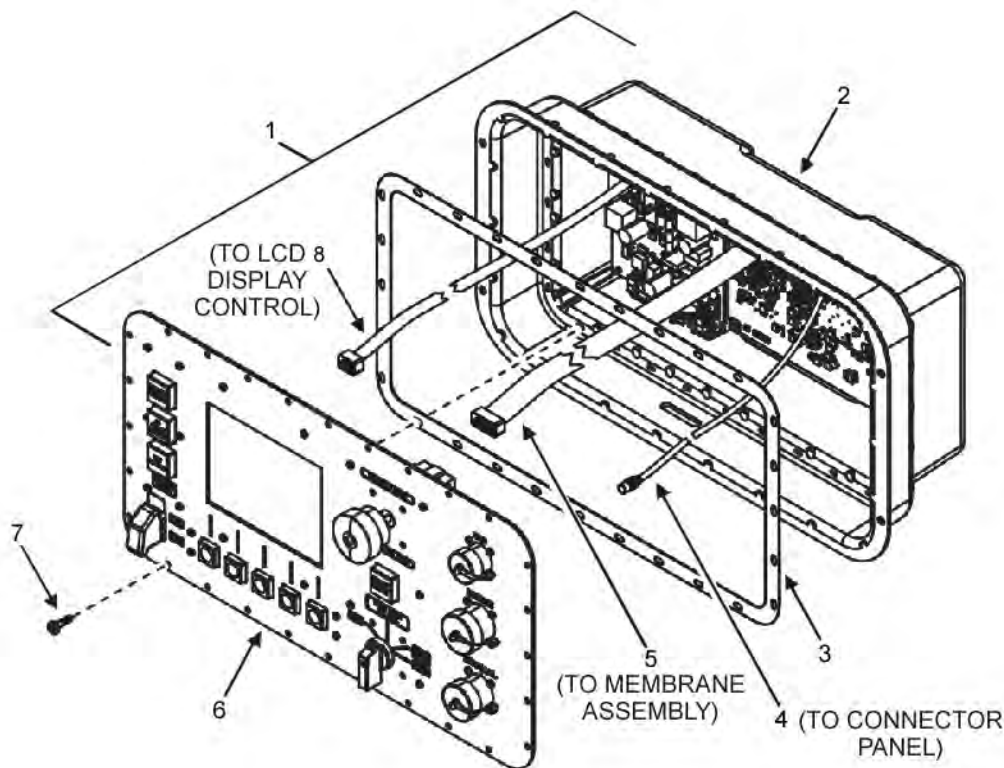
Remove DCS Control Panel Assembly

Figure 1. DCS Control Panel and Enclosure.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Remove negative ground cable from right-hand battery (WP 0036, Remove/Install Batteries).
3. Open DCS door, and secure in fully open position.
4. Remove 28 screws (Figure 1, Item 7) that secure DCS control panel (Figure 1, Item 6) to DCS enclosure (Figure 1, Item 2).
5. Break seal between DCS control panel (Figure 1, Item 6) and DCS enclosure (Figure 1, Item 2) using putty knife or other appropriate tool.
6. Lift DCS control panel (Figure 1, Item 6) from DCS enclosure (Figure 1, Item 2) high enough to access three wiring harnesses (Figure 1, Items 4, 5, and 8) connecting DCS control panel (Figure 1, Item 6) to DCS enclosure (Figure 1, Item 2).

CAUTION

Printed circuit boards/cards contain components that are sensitive to static electricity. Always wear an antistatic wrist strap connected to a metal surface to channel static electricity to ground when handling printed circuit boards/cards. Failure to comply may cause damage to equipment.

REPAIR DCS – CONTINUED**NOTE**

Prior to removal, tag all electrical wires, cables, and leads for identification. Tags will be used as a guide during installation.

7. Tag and remove three wiring harnesses (Figure 1, Items 4, 5, and 8) that connect DCS control panel (Figure 1, Item 6) to DCS enclosure (Figure 1, Item 2).
8. Unhook clips on wiring harnesses and remove harnesses from DCS control panel (Figure 1, Item 6):
 - a. Tag and remove six-pin wiring harness (Figure 1, Item 4) connected to connector panel control card (not shown) of DCS control panel (Figure 1, Item 6).
 - b. Tag and remove 14-pin wiring harness (Figure 1, Item 8) connected to display control card (not shown) of DCS control panel (Figure 1, Item 6).
 - c. Tag and remove 22-pin wiring harness (Figure 1, Item 5) connected to membrane panel assembly (not shown) of DCS control panel (Figure 1, Item 6).
9. Remove DCS control panel (Figure 1, Item 6) from DCS enclosure (Figure 1, Item 2), and place on a suitable work surface.
10. Remove and discard gasket (Figure 1, Item 3) from DCS control panel (Figure 1, Item 6).
11. Remove all residual gasket material from DCS control panel (Figure 1, Item 6) and DCS enclosure (Figure 1, Item 2) using an abrasive pad. Be sure to remove all loose gasket material from components.

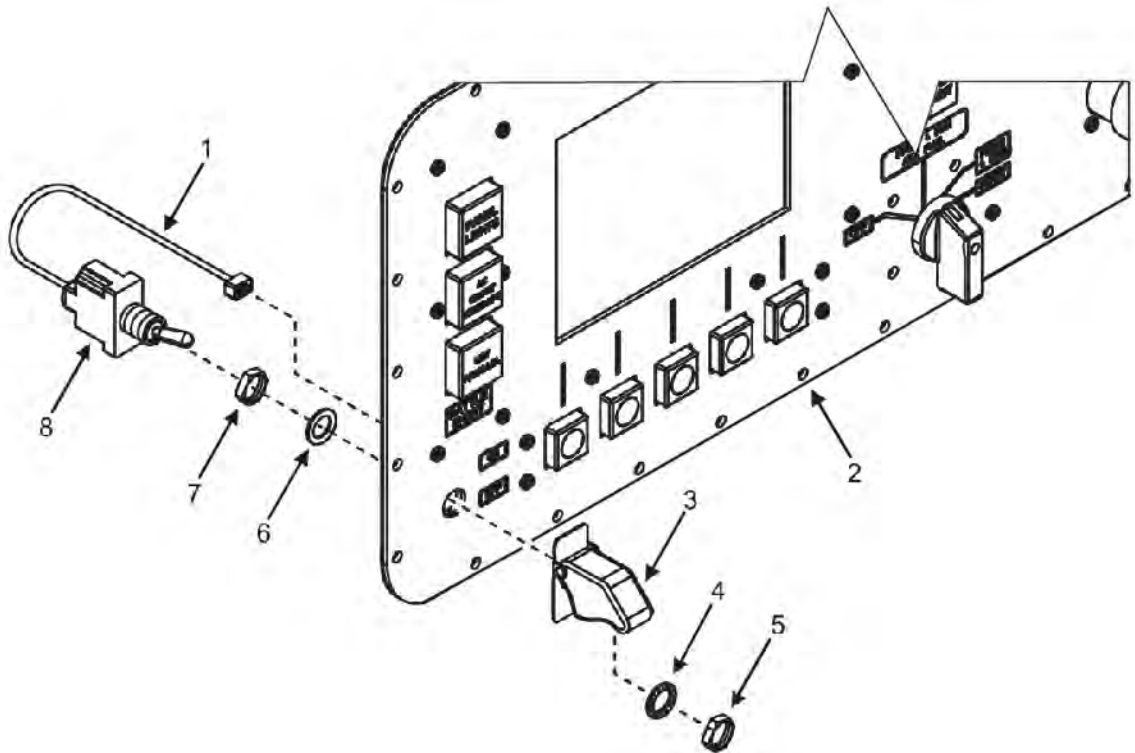
END OF TASK**Test/Replace Switches**

Figure 2. BATTLESHORT Switch.

REPAIR DCS – CONTINUED

1. Ensure equipment conditions are met in the order presented in initial setup.
2. Remove DCS control panel assembly and place on a suitable work surface (Remove DCS Control Panel Assembly task).
3. Test BATTLESHORT switch (Figure 2, Item 8):
 - a. Remove wiring harness (Figure 2, Item 1) from membrane panel assembly (not shown).

NOTE

Continuity should be present when BATTLESHORT switch (Figure 2, Item 8) is in ON position. There should be no continuity when BATTLESHORT switch (Figure 2, Item 8) is in OFF position.

- b. Place BATTLESHORT switch (Figure 2, Item 8) in ON position and using a multimeter set to test continuity, test wires P1 (P1/SW-3) and P3 (P3/SW-2) through wiring harness (Figure 2, Item 1).
 - c. Proceed to Step 3d if no continuity is found or Step 3f if continuity is found.
 - d. Leave BATTLESHORT switch (Figure 2, Item 8) in ON position, and using a multimeter set to test continuity, test two terminals on bottom of BATTLESHORT switch (Figure 2, Item 8).
 - e. Repair or replace wiring harness (Figure 2, Item 1) if continuity is found or replace BATTLESHORT switch (Figure 2, Item 8) if no continuity is found (Step 4). Retest IAW Step 3b and repair or replace wiring harness (Figure 2, Item 1) as required.
 - f. Place BATTLESHORT switch (Figure 2, Item 8) in OFF position and using a multimeter set to test continuity, test wires P1 (P1/SW-3) and P3 (P3/SW-2) through wiring harness (Figure 2, Item 1).
 - g. Proceed to Step 3j if no continuity is found or Step 3h if continuity is found.
 - h. Leave BATTLESHORT switch (Figure 2, Item 8) in OFF position and using a multimeter set to test continuity, test two terminals on bottom of BATTLESHORT switch (Figure 2, Item 8).
 - i. Repair or replace wiring harness (Figure 2, Item 1) if continuity is found or replace BATTLESHORT switch (Figure 2, Item 8) if no continuity is found (Step 4). Retest IAW Step 3f and repair or replace wiring harness (Figure 2, Item 1) as required.
 - j. Install wiring harness (Figure 2, Item 1) to membrane panel assembly (not shown).
4. Remove BATTLESHORT switch (Figure 2, Item 8):

CAUTION

Printed circuit boards/cards contain components that are sensitive to static electricity. Always wear an antistatic wrist strap connected to a metal surface to channel static electricity to ground when handling printed circuit boards/cards. Failure to comply may cause damage to equipment.

NOTE

Prior to removal, tag all electrical wires, cables, and leads for identification. Tags will be used as a guide during installation.

- a. Tag wiring harness (Figure 2, Item 1) from BATTLESHORT switch (Figure 2, Item 8) to membrane panel assembly (not shown) of DCS control panel (Figure 2, Item 2).
 - b. Unhook clip on wiring harness (Figure 2, Item 1), and remove wiring harness (Figure 2, Item 1) from membrane panel assembly (not shown).

REPAIR DCS – CONTINUED

- c. Move BATTLESHORT switch cover (Figure 2, Item 3) on BATTLESHORT switch (Figure 2, Item 8) to open position.
 - d. Remove nut (Figure 2, Item 5) and internal tooth lockwasher (Figure 2, Item 4) securing BATTLESHORT switch (Figure 2, Item 8) to front of DCS control panel (Figure 2, Item 2).
 - e. Discard internal tooth lockwasher (Figure 2, Item 4) and sealing ring (Figure 2, Item 6).
 - f. Remove BATTLESHORT switch (Figure 2, Item 8) and BATTLESHORT switch cover (Figure 2, Item 3) from DCS control panel (Figure 2, Item 2).
 - g. Remove jamnut (Figure 2, Item 7) from BATTLESHORT switch (Figure 2, Item 8).
 - h. Inspect BATTLESHORT switch (Figure 2, Item 8) for signs of obvious damage. Replace as required.
5. Install BATTLESHORT switch (Figure 2, Item 8):
- a. Align tab on DCS control panel (Figure 2, Item 2) to slot in BATTLESHORT switch (Figure 2, Item 8).
 - b. Position BATTLESHORT switch (Figure 2, Item 8), jamnut (Figure 2, Item 7), and new sealing ring (Figure 2, Item 6) to mounting location on rear of DCS control panel (Figure 2, Item 2), engaging alignment tab on DCS control panel (Figure 2, Item 2) to slot in BATTLESHORT switch (Figure 2, Item 8).
 - c. Secure BATTLESHORT switch (Figure 2, Item 8) to DCS control panel (Figure 2, Item 2) by installing BATTLESHORT switch cover (Figure 2, Item 3), new internal tooth lockwasher (Figure 2, Item 4), and nut (Figure 2, Item 5) to BATTLESHORT switch (Figure 2, Item 8).

CAUTION

Printed circuit boards/cards contain components that are sensitive to static electricity. Always wear an antistatic wrist strap connected to a metal surface to channel static electricity to ground when handling printed circuit boards/cards. Failure to comply may cause damage to equipment.

CAUTION

Ensure hooks on all wiring harnesses are latched properly after installation. Failure to comply may cause damage to equipment.

NOTE

Identification tags should remain in place until the DCS is completely reassembled and has been tested for proper operation.

- d. Install electrical connector on BATTLESHORT switch (Figure 2, Item 8) to corresponding connector on membrane panel control card (not shown).

REPAIR DCS – CONTINUED

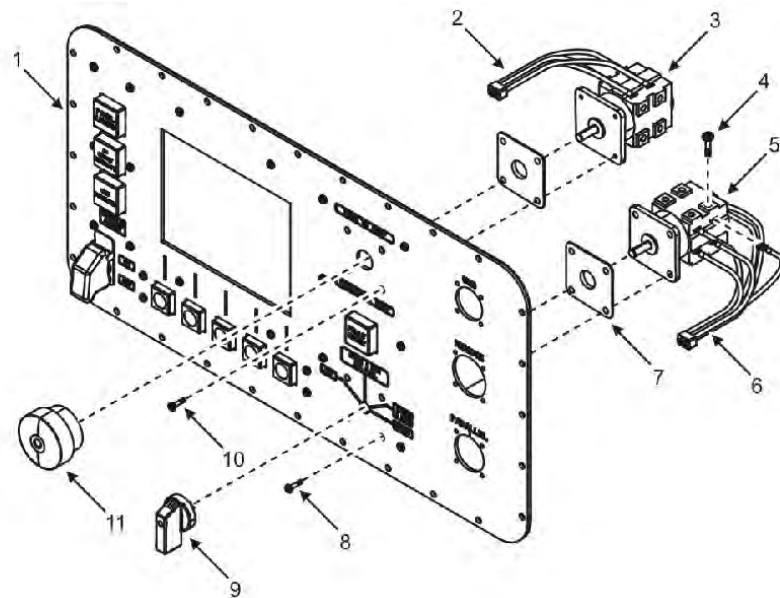


Figure 3. EMERGENCY STOP and Engine Control Switches.

6. Test EMERGENCY STOP switch (Figure 3, Item 3):

- a. Remove wiring harness (Figure 3, Item 2) from membrane panel assembly (not shown).

NOTE

Continuity should be present when EMERGENCY STOP switch (Figure 3, Item 3) is in extended (off) position. There should be no continuity when EMERGENCY STOP switch (Figure 3, Item 3) is in PUSH TO STOP (on) position.

- b. Pull EMERGENCY STOP switch (Figure 3, Item 3) to extended position (off), and using a multimeter set to test continuity, test wires to terminals 5 and 6 (P205-1/S202-5 and P205-2/S202-6) through wiring harness (Figure 3, Item 2).
- c. Proceed to Step 6d if no continuity is found or Step 6f if continuity is found.
- d. Leave EMERGENCY STOP switch (Figure 3, Item 3) in extended position (off), and using a multimeter set to test continuity, test terminals 5 and 6 on EMERGENCY STOP switch (Figure 3, Item 3).
- e. Repair or replace wiring harness (Figure 3, Item 2) if continuity is found or replace EMERGENCY STOP switch (Figure 3, Item 3) if no continuity is found (Step 7). Retest IAW Step 6b, and repair or replace wiring harness (Figure 3, Item 2) as required.
- f. Repeat Steps a through e for wires to terminals 7 and 8 (P205-4/S202-7 and P205-5/S202-8) and EMERGENCY STOP switch (Figure 3, Item 3) terminals 7 and 8.
- g. Push EMERGENCY STOP switch (Figure 3, Item 3) to PUSH TO STOP position (on), and using a multimeter set to test continuity, test wires to terminals 5 and 6 (P205-1/S202-5 and P205-2/S202-6) through wiring harness (Figure 3, Item 2).
- h. Proceed to Step 6i if continuity is found or Step 6k if no continuity is found.

REPAIR DCS – CONTINUED

- i. Leave EMERGENCY STOP switch (Figure 3, Item 3) in PUSH TO STOP position (on), and using a multimeter set to test continuity, test terminals 5 and 6 on EMERGENCY STOP switch (Figure 3, Item 2).
 - j. Repair or replace wiring harness (Figure 3, Item 2) if no continuity is found or replace EMERGENCY STOP switch (Figure 3, Item 3) if continuity is found (Step 7). Retest IAW Step 6g, and repair or replace wiring harness (Figure 3, Item 2) as required.
 - k. Repeat Steps g through j for wires to terminals 7 and 8 (P205-4/S202-7 and P205-5/S202-8) and EMERGENCY STOP switch (Figure 3, Item 3) terminals 7 and 8.
 - l. Install wiring harness (Figure 3, Item 2) to membrane panel assembly (not shown).
7. Remove EMERGENCY STOP switch (Figure 3, Item 3):

NOTE

Sealing gasket, sealing screws, and handle for EMERGENCY STOP switch are available only with a new EMERGENCY STOP switch.

- a. Loosen setscrew (not shown) securing handle (Figure 3, Item 11) to EMERGENCY STOP switch (Figure 3, Item 3) on front of DCS control panel (Figure 3, Item 1).
- b. Remove and discard handle (Figure 3, Item 11) from EMERGENCY STOP switch (Figure 3, Item 3).

CAUTION

Printed circuit boards/cards contain components that are sensitive to static electricity. Always wear an antistatic wrist strap connected to a metal surface to channel static electricity to ground when handling printed circuit boards/cards. Failure to comply may cause damage to equipment.

NOTE

Prior to removal, tag all electrical wires, cables, and leads for identification. Tags will be used as a guide during installation.

- c. Tag wiring harness (Figure 3, Item 2) from EMERGENCY STOP switch (Figure 3, Item 3) to membrane panel assembly (not shown) of DCS control panel (Figure 3, Item 1).
 - d. Unhook clip on wiring harness (Figure 3, Item 2), and remove harness (Figure 3, Item 2) from membrane panel assembly (not shown).
 - e. Remove and discard four mounting screws (Figure 3, Item 10) securing EMERGENCY STOP switch (Figure 3, Item 3) to front of DCS control panel (Figure 3, Item 1).
 - f. Remove and discard EMERGENCY STOP switch (Figure 3, Item 3) and gasket (Figure 3, Item 7) from rear of DCS control panel (Figure 3, Item 1).
 - g. Tag and remove four wires from EMERGENCY STOP switch (Figure 3, Item 3) by removing screws (Figure 3, Item 4).
8. Install EMERGENCY STOP switch (Figure 3, Item 3):

NOTE

Identification tags should remain in place until the DCS is completely reassembled and has been tested for proper operation.

REPAIR DCS – CONTINUED

Apply a thin coat of electrically conductive grease to all electrical connections prior to assembly.

- a. Install four wires of wiring harness (Figure 3, Item 2) to contacts on EMERGENCY STOP switch (Figure 3, Item 3) using tags applied at removal as a guide.
- b. Position new gasket (Figure 3, Item 7) (supplied with new EMERGENCY STOP switch (Figure 3, Item 3)) and new EMERGENCY STOP switch (Figure 3, Item 3) to mounting location on rear of DCS control panel (Figure 3, Item 1) and align mounting holes.
- c. Secure EMERGENCY STOP switch (Figure 3, Item 3) to DCS control panel (Figure 3, Item 1) by installing four new mounting screws (Figure 3, Item 10) (supplied with new EMERGENCY STOP switch (Figure 3, Item 3)) through front of DCS control panel (Figure 3, Item 1).

CAUTION

Printed circuit boards/cards contain components that are sensitive to static electricity. Always wear an antistatic wrist strap connected to a metal surface to channel static electricity to ground when handling printed circuit boards/cards. Failure to comply may cause damage to equipment.

CAUTION

Ensure hooks on all wiring harnesses are latched properly after installation. Failure to comply may cause damage to equipment.

- d. Install connector of wiring harness (Figure 3, Item 2) to corresponding connector on membrane panel assembly (not shown).
 - e. Install new handle (Figure 3, Item 11) (supplied with new EMERGENCY STOP switch (Figure 3, Item 3)) to EMERGENCY STOP switch (Figure 3, Item 3), and tighten setscrew to secure.
9. Test engine control switch (Figure 3, Item 5):
- a. Remove wiring harness (Figure 3, Item 6) from membrane panel assembly (not shown).

NOTE

Engine control switch will show continuity between SW COMMON (P206-6/S201-1) and one other wire for each corresponding position chosen. When holding between PRIME & RUN and START positions, continuity will be between PRIME/RUN SW (P206-3/S201-6) and ROTARY START SW (P206-4/S201-8).

- b. Turn engine control switch (Figure 3, Item 5) to OFF position and using a multimeter set to test continuity, test wires SW COMMON (P206-6/S201-1) and OFF SW (P206-1/S201-2) through wiring harness (Figure 3, Item 6).
- c. Proceed to Step 9f if continuity is found or Step 9d if no continuity is found.
- d. Using a multimeter set to test continuity, test terminals 1 and 2 on engine control switch (Figure 3, Item 5).
- e. Repair or replace wiring harness (Figure 3, Item 6) if continuity is found, or replace engine control switch (Figure 3, Item 5) if no continuity is found (Step 10). Retest IAW Step 9b and repair or replace wiring harness (Figure 3, Item 6) as required.
- f. Turn engine control switch (Figure 3, Item 5) to PRIME & RUN AUX FUEL position and using a multimeter set to test continuity, test wires SW COMMON (P206-6/S201-1) and PRIME/AUX SW (P206-2/S201-4) through wiring harness (Figure 3, Item 6).

REPAIR DCS – CONTINUED

- g. Proceed to Step 9j if continuity is found or Step 9h if no continuity is found.
- h. Using a multimeter set to test continuity, test terminals 1 and 4 on engine control switch (Figure 3, Item 5).
- i. Repair or replace wiring harness (Figure 3, Item 6) if continuity is found, or replace engine control switch (Figure 3, Item 5) if no continuity is found (Step 10). Retest IAW Step 9f and repair or replace wiring harness (Figure 3, Item 6) as required.
- j. Turn engine control switch (Figure 3, Item 5) to PRIME & RUN position and using a multimeter set to test continuity, test wires SW COMMON (P206-6/S201-1) and PRIME/RUN SW (P206-3/S201-6) through wiring harness (Figure 3, Item 6).
- k. Proceed to Step 9n if continuity is found or Step 9l if no continuity is found.
- l. Using a multimeter set to test continuity, test terminals 1 and 6 on engine control switch (Figure 3, Item 5).
- m. Repair or replace wiring harness (Figure 3, Item 6) if continuity is found or replace engine control switch (Figure 3, Item 5) if no continuity is found (Step 10). Retest IAW Step 9j and repair or replace wiring harness (Figure 3, Item 6) as required.

NOTE

Use of an assistant is required when holding engine control switch in START position to measure continuity. Engine control switch must be held in START position in order to obtain an accurate measurement.

- n. Hold engine control switch (Figure 3, Item 5) in START position and using a multimeter set to test continuity, test wires SW COMMON (P206-6/S201-1) and ROTARY START SW (P206-4/S201-8) through wiring harness (Figure 3, Item 6).
- o. Proceed to Step 9r if continuity is found or Step 9p if no continuity is found.
- p. Using a multimeter set to test continuity, test terminals 1 and 8 on engine control switch (Figure 3, Item 5).
- q. Repair or replace wiring harness (Figure 3, Item 6) if continuity is found, or replace engine control switch (Figure 3, Item 5) if no continuity is found (Step 10). Retest IAW Step 9n and repair or replace wiring harness (Figure 3, Item 6) as required.

NOTE

When engine control switch (Figure 3, Item 5) is turned slowly from PRIME & RUN to START position, a momentary continuity reading should be obtained. Use of an assistant is required when moving engine control switch (Figure 3, Item 5) between PRIME & RUN and START positions to measure continuity. Engine control switch (Figure 3, Item 5) must be moved to position between PRIME & RUN and START in order to obtain accurate reading.

- r. Move engine control switch (Figure 3, Item 5) back and forth slowly from START to PRIME & RUN and from PRIME & RUN to START while using a multimeter set to test continuity, testing wires PRIME/RUN SW (P206-3/S201-6) and ROTARY START SW (P206-4/S201-8).
- s. Proceed to Step 9v if continuity is found or Step 9t if no continuity is found.
- t. Move engine control switch (Figure 3, Item 5) back and forth slowly from START to PRIME & RUN and from PRIME & RUN to START while using a multimeter set to test continuity, testing terminals 6 and 8 on engine control switch (Figure 3, Item 5).

REPAIR DCS – CONTINUED

- u. Repair or replace wiring harness (Figure 3, Item 6) if continuity is found or replace engine control switch (Figure 3, Item 5) if no continuity is found (Step 10). Retest IAW Step 9r and repair or replace wiring harness (Figure 3, Item 6) as required.
 - v. Install wiring harness (Figure 3, Item 6) to membrane panel assembly (not shown).
10. Remove engine control switch (Figure 3, Item 5):

NOTE

Sealing gasket, sealing screws, and handle for engine control switch are available only with a new engine control switch.

- a. Loosen setscrew (not shown) securing handle (Figure 3, Item 9) to engine control switch (Figure 3, Item 5) on front of DCS control panel (Figure 3, Item 1).
- b. Remove and discard handle (Figure 3, Item 9) from engine control switch (Figure 3, Item 5).

CAUTION

Printed circuit boards/cards contain components that are sensitive to static electricity. Always wear an antistatic wrist strap connected to a metal surface to channel static electricity to ground when handling printed circuit boards/cards. Failure to comply may cause damage to equipment.

NOTE

Prior to removal, tag all electrical wires, cables, and leads for identification. Tags will be used as a guide during installation.

- c. Tag wiring harness (Figure 3, Item 6) from engine control switch (Figure 3, Item 5) to membrane panel assembly (not shown) of DCS control panel (Figure 3, Item 1).
 - d. Unhook clip on wiring harness (Figure 3, Item 6) and remove wiring harness (Figure 3, Item 6) from membrane panel assembly (not shown).
 - e. Remove and discard four mounting screws (Figure 3, Item 8) securing engine control switch (Figure 3, Item 5) to front of DCS control panel (Figure 3, Item 1).
 - f. Remove and discard engine control switch (Figure 3, Item 5) and gasket (Figure 3, Item 7) from front of DCS control panel (Figure 3, Item 1).
 - g. Tag and remove six wires of wiring harness (Figure 3, Item 6) from engine control switch (Figure 3, Item 5) by removing six screws (Figure 3, Item 4).
11. Install engine control switch (Figure 3, Item 5):
- a. Install six wires of wiring harness (Figure 3, Item 6) to contacts on engine control switch (Figure 3, Item 5) using tags applied at removal as a guide. Secure with six screws (Figure 3, Item 4).
 - b. Position new gasket (Figure 3, Item 7) (supplied with new engine control switch (Figure 3, Item 5)) and new engine control switch (Figure 3, Item 5) to mounting location on rear of DCS control panel (Figure 3, Item 1), and align mounting holes.
 - c. Secure engine control switch (Figure 3, Item 5) to DCS control panel (Figure 3, Item 1) by installing four new mounting screws (Figure 3, Item 8) (supplied with new engine control switch (Figure 3, Item 5)) through front of DCS control panel (Figure 3, Item 1).

REPAIR DCS – CONTINUED**CAUTION**

Printed circuit boards/cards contain components that are sensitive to static electricity. Always wear an antistatic wrist strap connected to a metal surface to channel static electricity to ground when handling printed circuit boards/cards. Failure to comply may cause damage to equipment.

CAUTION

Ensure hooks on all wiring harnesses are latched properly after installation. Failure to comply may cause damage to equipment.

NOTE

Identification tags should remain in place until the DCS is completely reassembled and has been tested for proper operation.

Apply a thin coat of electrically conductive grease to all electrical connections prior to assembly.

- d. Install connector of wiring harness (Figure 3, Item 6) to corresponding connector on membrane panel assembly (not shown).
 - e. Install new handle (Figure 3, Item 9) (supplied with new engine control switch (Figure 3, Item 5)) to engine control switch (Figure 3, Item 5), and tighten setscrew (not shown) to secure.
12. Install DCS control panel assembly. See Install DCS Control Panel Assembly task.

END OF TASK**Install DCS Control Panel Assembly**

- 1. Remove protective strips from self-adhesive surface of new gasket (Figure 1, Item 3).
- 2. Align the mounting holes carefully and apply new gasket (Figure 1, Item 3) to rear face of DCS control panel (Figure 1, Item 6).

CAUTION

Do not secure DCS control panel at this time.

- 3. Position DCS control panel (Figure 1, Item 6) to its mounting location on DCS enclosure (Figure 1, Item 2).
- 4. Lift DCS control panel (Figure 1, Item 6) far enough from DCS enclosure (Figure 1, Item 2) to allow access to wiring harnesses.

CAUTION

Printed circuit boards/cards contain components that are sensitive to static electricity. Always wear an antistatic wrist strap connected to a metal surface to channel static electricity to ground when handling printed circuit boards/cards. Failure to comply may cause damage to equipment.

CAUTION

Ensure hooks on all wiring harnesses are latched properly after installation. Failure to comply may cause damage to equipment.

- 5. Install three wiring harnesses to DCS control panel (Figure 1, Item 6) at corresponding connectors using tags applied at removal as a guide:

REPAIR DCS – CONTINUED

- a. Install six-pin wiring harness (Figure 1, Item 4) to main control card (not shown).
 - b. Install 22-pin wiring harness (Figure 1, Item 5) to main control card (not shown).
 - c. Install 14-pin wiring harness (Figure 1, Item 8) to power supply control card (not shown).
6. Position DCS control panel (Figure 1, Item 6) to its mounting location on DCS enclosure (Figure 1, Item 2), and align mounting holes.
 7. Secure DCS control panel (Figure 1, Item 6) to DCS enclosure (Figure 1, Item 2) by installing 28 new locking screws (Figure 1, Item 7).
 8. Torque 28 locking screws (Figure 1, Item 7) to 15.9-19.5 in•lb (1.8-2.2 N•m).
 9. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
 10. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
 11. Start engine and check for proper operation (TM 9-6115-749-10).
 12. Repair as required.
 13. Close DCS door.

END OF TASK**Check DCS Diagnostic LEDs**

1. Ensure equipment conditions are met in order presented in initial setup.
2. Open DCS door and secure in open position.

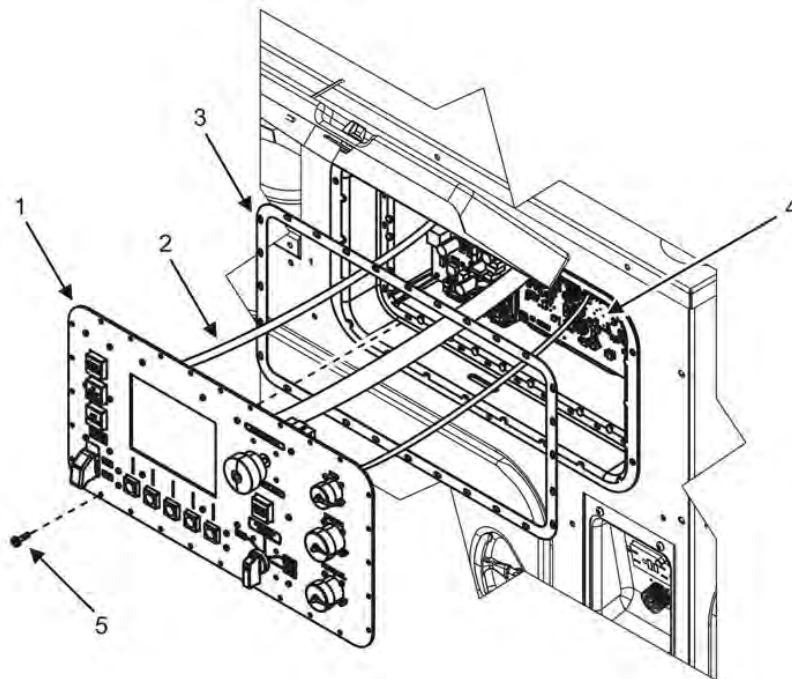


Figure 4. Accessing DCS Diagnostic LEDs.

REPAIR DCS – CONTINUED

3. Remove and discard 28 locking screws (Figure 4, Item 5) securing DCS control panel (Figure 4, Item 1) to DCS enclosure (Figure 4, Item 4).
4. Pull DCS control panel (Figure 4, Item 1) from DCS enclosure (Figure 4, Item 4) far enough to view printed circuit cards in rear of DCS enclosure (Figure 4, Item 4) and on rear of DCS control panel (Figure 4, Item 1).
5. Inspect seal (Figure 4, Item 3) between DCS enclosure (Figure 4, Item 4) and DCS control panel (Figure 4, Item 1) for signs of obvious damage. Remove and discard seal (Figure 4, Item 3) if damaged (WP 0017, Remove/Install DCS).
6. Secure DCS control panel (Figure 4, Item 1) with baling wire in a position that does not put stress on three cables (Figure 4, Item 2) running from DCS enclosure (Figure 4, Item 4) to DCS control panel (Figure 4, Item 1).

NOTE

Several LEDs should illuminate when engine control switch is in the PRIME & RUN position.

7. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
8. Troubleshoot electrical system (WP 0008, Electrical System Troubleshooting with a DCS Code) if LEDs do not illuminate.

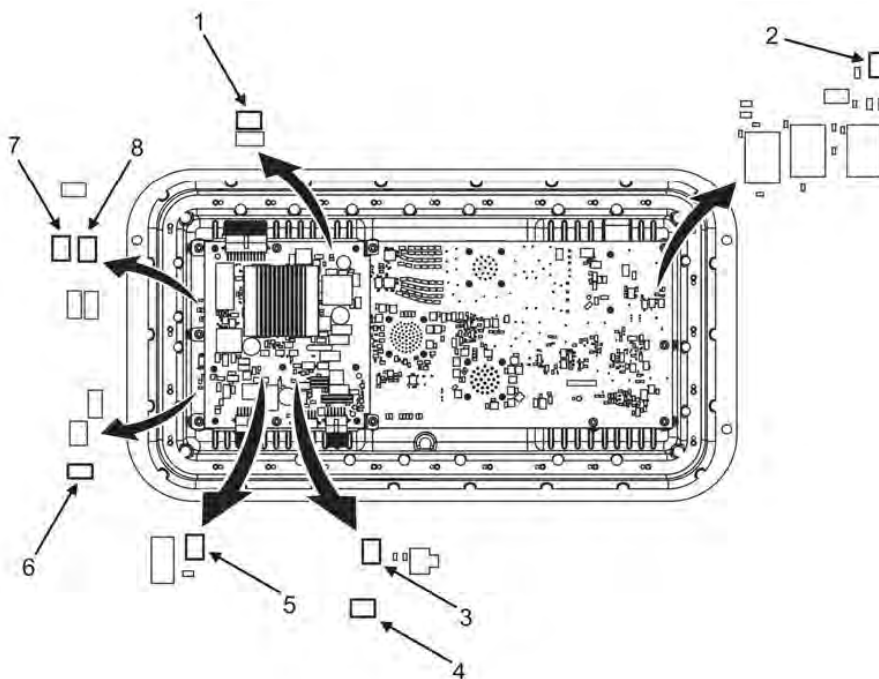


Figure 5. DCS Enclosure LEDs.

9. Observe LEDs on printed circuit boards inside DCS enclosure (Figure 4, Item 4).
10. Consult Figure 5 and Table 1 for proper function of LEDs.

REPAIR DCS – CONTINUED

Table 1. DCS Enclosure LEDs.

LED INDICATOR	DESCRIPTION	BLINK RATE/STATUS	SERVICE STEPS REQUIRED
5216 HEARTBEAT DS200 (Figure 5, Item 8)	Main processor function LED. The color is green.	1. [Normal Mode]: Blinks at 0.5 Hz (1 sec on, 1 sec off) when U206 is running normally with application firmware. 2. [Boot Mode]: Blinks at 2 Hz (0.25 sec on, 0.25 sec off) when U206 is running boot firmware. 3. [OFF Mode]: Not blinking. 4. [Abnormal Mode]: 100% on.	1. [Normal Mode]: None. 2. [Boot Mode]: Load firmware into controller. Use InPower AMMPS Service Tool software. 3. [OFF Mode]: Check power to the controller. Make sure EMERGENCY STOP is not active. Rotate engine control switch from OFF position. If DS300 is blinking normally and DS200 is not blinking, see Step 11. 4. [Abnormal Mode]: See Step 11.
COMMON ALARM DS201 (Figure 5, Item 7)	Common alarm LED. The color is red.	LED is active when there is a warning or shutdown fault on the generator set.	Check warning/fault status on DCS. Take appropriate service response. Press FAULT RESET on DCS to clear the fault indicator.
5213 HEARTBEAT DS300 (Figure 5, Item 6)	Main control co-processor function LED. The color is green.	1. [Normal Mode]: Blinks at 0.5 Hz (1 sec on, 1 sec off) when U206 is running normally with application firmware. 2. [Boot Mode]: Blinks at 2 Hz (0.25 sec on, 0.25 sec off) when U206 is running boot firmware. 3. [OFF Mode]: Not blinking. 4. [Abnormal Mode]: 100% on.	1. [Normal Mode]: None. 2. [Boot Mode]: Load firmware into controller. Use InPower AMMPS Service Tool software. 3. [OFF Mode]: Check power to the controller. Make sure EMERGENCY STOP is not active. Rotate engine control switch from OFF position. If DS200 is blinking normally and DS300 is not blinking, see Step 11. 4. [Abnormal Mode]: See Step 11.
DS1100 (Figure 5, Item 2)	Automatic Voltage Regulator (AVR) power supply status LED. The color is green.	If the DCS is powered and running normally, the LED will be active (on). This LED indicates the AVR section of the main board has power.	If the LED is off, check power to the controller. Make sure EMERGENCY STOP is not active. Rotate engine control switch from OFF position. If

REPAIR DCS – CONTINUED

Table 1. DCS Enclosure LEDs. – Continued

LED INDICATOR	DESCRIPTION	BLINK RATE/STATUS	SERVICE STEPS REQUIRED
DS100 (Figure 5, Item 1)	Non-isolated power supply LED. The color is green.	Should be 100% on when the DCS is powered and running normally.	the LED does not turn on and the processor LEDs are working normally, see Step 11. If LED is off, check that DCS is powered normally and EMERGENCY STOP is not active. If DCS is powered normally and LED is inactive, see Step 11.
DS101 (Figure 5, Item 5)	Isolated power supply LED. The color is green.	Should be 100% on when the DCS is powered and running normally.	If LED is off, check that DCS is powered normally and EMERGENCY STOP is not active. If DCS is powered normally and LED is inactive, see Step 11.
DS200 (Figure 5, Item 4)	DCS control power LED. The color is green.	Should be 100% on when the DCS is powered and running normally. This will be off if the DCS is not powered up and running.	If LED is off, check that DCS is powered normally and EMERGENCY STOP is not active. If DCS is powered normally and LED is inactive, see Step 11.
DS201 (Figure 5, Item 3)	Power supply control card heater LED. The color is green.	LED is normally off. This LED goes on when the DCS heater system is active. This will be at extremely low ambient temperatures (-33 to -51 °F (-36 to -46 °C)).	No service steps are required. Normal operation is not affected by this circuit. Only low temperature conditions can verify the operation of this circuit.

11. Replace DCS (WP 0017, Remove/Install DCS) if LEDs do not function IAW Table 1.

REPAIR DCS – CONTINUED

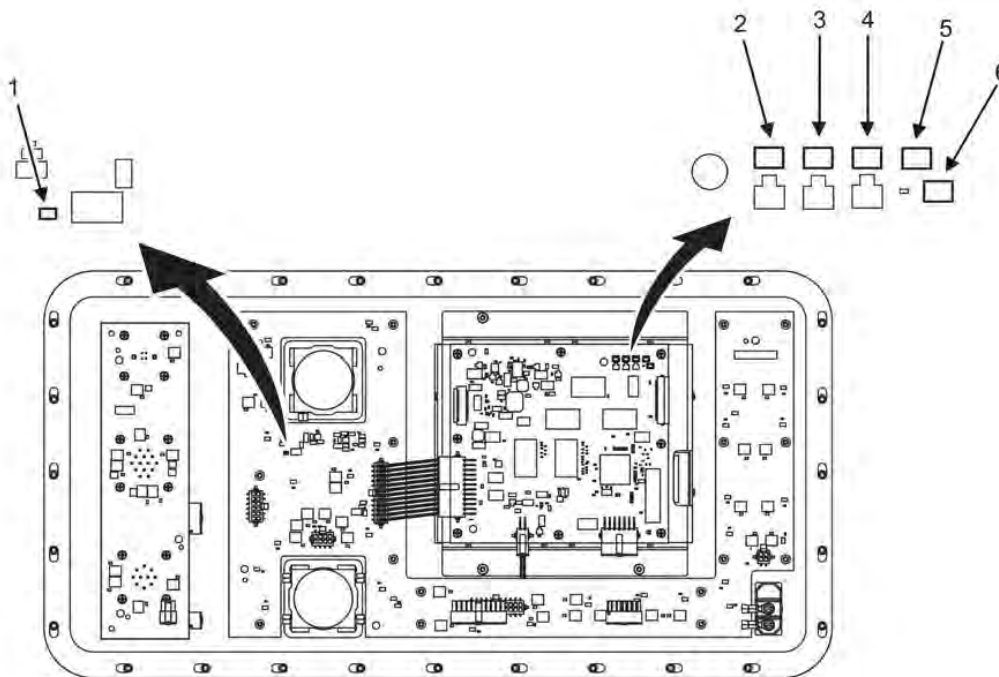


Figure 6. DCS Control Panel LEDs.

12. Observe LEDs on printed circuit boards on rear of DCS control panel (Figure 4, Item 1).
13. Consult Figure 6 and Table 2 for proper function of LEDs.

Table 2. DCS Control Panel LEDs.

LED INDICATOR	DESCRIPTION	BLINK RATE/STATUS	SERVICE STEPS REQUIRED
DS1 (Figure 6, Item 6)	3.3 V DCS power LED. The color is green.	Should be 100% on when the DCS is powered and running normally.	If LED is off, check that DCS is powered normally and EMERGENCY STOP is not active. If DCS is powered normally and LED is inactive, see Step 14.
DS2 (Figure 6, Item 2)	Display controller microcontroller status LED. The color is green.	1. [OFF Mode]: LED is off. 2. [Initialization Mode]: Blinks very fast during power-up initialization. 3. [Boot Mode]: Blinks at 2 Hz (0.25 sec on, 0.25 sec off) when U1 is running the boot block firmware.	1. If LED is off, check that DCS is powered normally and EMERGENCY STOP is not active. 2. If device is in initialization mode, wait 10 sec and check again. If system does not leave initialization mode, check for [Boot Mode] and see Step 14.

REPAIR DCS – CONTINUED

Table 2. DCS Control Panel LEDs. – Continued

LED INDICATOR	DESCRIPTION	BLINK RATE/STATUS	SERVICE STEPS REQUIRED
		4. [Normal Mode]: Blinks at 0.5 Hz (1 sec on, 1 sec off) when U1 micro-controller is running the application firmware.	3. If device is in the boot mode, load firmware into controller with InPower AMMPS software loaded on Maintenance Support Device (MSD).
		5. [Abnormal Mode]: 100% on. This indicates the system is not running and has a fault.	4. Normal mode requires no service actions to this assembly. 5. If device LED is stuck 100% on, see Step 14.
DS3 (Figure 6, Item 3)	Display controller main controller communication LED. The color is red.	LED is normally off.	If LED is off, no service action is required. If LED is on, wait 10 sec for LED to turn off as communications initialize. If LED stays on indefinitely, check the cables between the main controller and the display controller. If LED stays on and cables are ok, see Step 14.
DS4 (Figure 6, Item 4)	LCD glass heater LED. The color is green.	LED is normally off. LED goes on when the DCS heater system is active. This will be at extremely low ambient temperatures (-4 to -51 °F (-20 to -46 °C)).	If ambient temperatures are above 32 °F (0 °C) and this LED is active, check display controller function. Check the cables for a short circuit between wires. See Step 14 if LED is always active at temperatures above 32 °F (0 °C).
DS5 (Figure 6, Item 5)	Display controller heater LED. The color is yellow.	LED is normally off. LED goes on when the DCS heater system is active. This will be at extremely low ambient temperatures (-33 to -51 °F (-36 to -46 °C)).	No service Steps are required. Normal operation is not affected by this circuit. Only low-temperature conditions can verify the operation of this circuit.
DS28 (Figure 6, Item 1)	Temperature sense circuitry LED. The color is green.	Should be 100% on when the DCS is powered and running normally.	If LED is off, check that DCS is powered normally and EMERGENCY STOP is not active. If DCS is powered normally and LED is inactive, see Step 14.

14. Replace DCS (WP 0017, Remove/Install DCS) if LEDs do not function IAW Table 1.

NOTE

LEDs should go off after DCS powers down when engine control switch is in the OFF position.

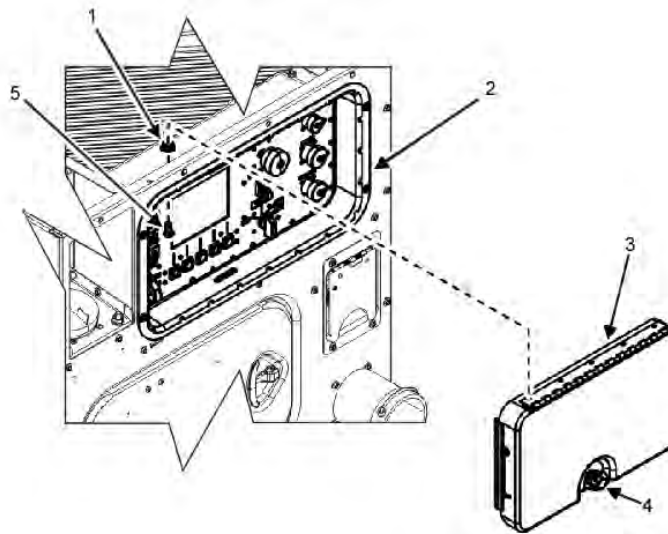
15. Turn engine control switch to OFF (TM 9-6115-749-10).
16. Install new seal (Figure 4, Item 3) to DCS enclosure (Figure 4, Item 4) if old seal was removed. See Install DCS Control Panel Assembly task.

REPAIR DCS – CONTINUED

17. Position DCS control panel (Figure 4, Item 1) to its mounting location on DCS enclosure (Figure 4, Item 4) and align the mounting holes.
18. Secure DCS control panel (Figure 4, Item 1) to DCS enclosure (Figure 4, Item 4) by installing 28 new locking screws (Figure 4, Item 5). Torque 28 locking screws (Figure 4, Item 5) to 15.9-19.5 in•lb (1.8-2.2 N•m).
19. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
20. Start engine and check for proper operation (TM 9-6115-749-10).
21. Repair as required.
22. Close DCS door.

END OF TASK**Remove DCS Door Assembly**

1. Ensure equipment conditions are met in order presented in initial setup.
2. Remove negative ground cable from right-hand battery (WP 0036, Remove/Install Batteries).
3. Remove top body panel (WP 0028, Remove/Install Top Body Panel).

**Figure 7. DCS Door - Removal.**

4. Support DCS door (Figure 7, Item 3) and remove five nuts (Figure 7, Item 1) and five screws (Figure 7, Item 5) that secure DCS door (Figure 7, Item 3) to DCS enclosure (Figure 7, Item 2).
5. Rotate DCS door latch (Figure 7, Item 4) and remove DCS door (Figure 7, Item 3) from unit.
6. Place DCS door (Figure 7, Item 3) on a suitable work surface.

END OF TASK

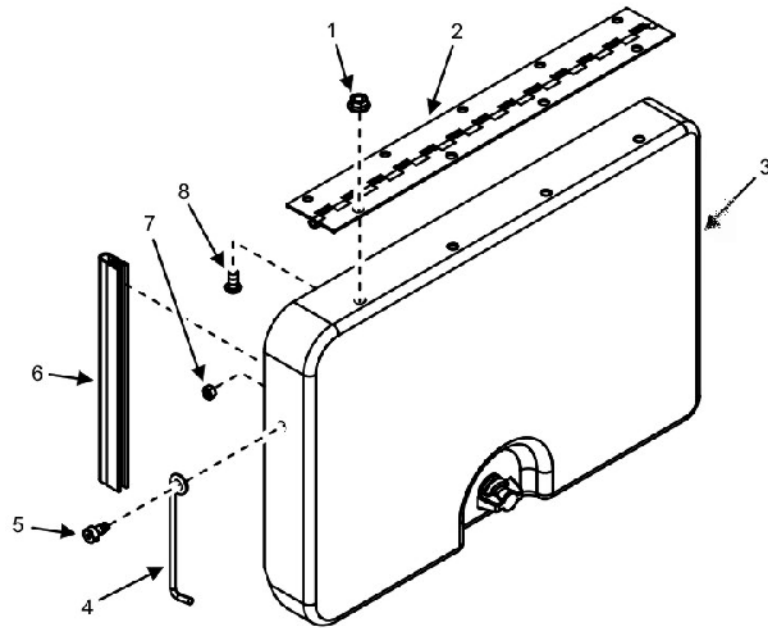
REPAIR DCS – CONTINUED**Disassemble DCS Door Assembly**

Figure 8. DCS Door - Disassembly.

1. Remove four screws (Figure 8, Item 8), four nuts (Figure 8, Item 1), and hinge (Figure 8, Item 2) from DCS door (Figure 8, Item 3).
2. Remove one screw (Figure 8, Item 5), one locknut (Figure 8, Item 7), and door prop (Figure 8, Item 4) from DCS door (Figure 8, Item 3). Discard locknut (Figure 8, Item 7).
3. Remove two rubber bumpers (Figure 8, Item 6) from edges of DCS door (Figure 8, Item 3).

END OF TASK**Inspect DCS Door Components**

1. Inspect hinge (Figure 8, Item 2). Replace hinge (Figure 8, Item 2) if bent, corroded, or binding.
2. Inspect door prop (Figure 8, Item 4). Replace door prop (Figure 8, Item 4) if bent, cracked, or broken.
3. Inspect rubber bumpers (Figure 8, Item 6). Replace rubber bumpers (Figure 8, Item 6) if cracked or torn.
4. Inspect DCS door (Figure 8, Item 3). Replace DCS door (Figure 8, Item 3) if punctured, cracked, corroded, or badly bent. Repair minor dents by hammering out.

END OF TASK**Assemble DCS Door Assembly**

1. Install two rubber bumpers (Figure 8, Item 6) to the inside edges of DCS door (Figure 8, Item 3).
2. Position door prop (Figure 8, Item 4) to its mounting position on outside of DCS door (Figure 8, Item 3) and secure by installing one screw (Figure 8, Item 5) and one new locknut (Figure 8, Item 7).

REPAIR DCS – CONTINUED

3. Position hinge (Figure 8, Item 2) to DCS door (Figure 8, Item 3) and secure by installing four screws (Figure 8, Item 8) and four nuts (Figure 8, Item 1).

END OF TASK**Install DCS Door Assembly**

1. Position DCS door (Figure 7, Item 3) to its mounting position on DCS enclosure (Figure 7, Item 2).
2. Support DCS door (Figure 7, Item 3), while installing five screws (Figure 7, Item 5) and five nuts (Figure 7, Item 1) to secure DCS door (Figure 7, Item 3) to DCS enclosure (Figure 7, Item 2).
3. Close DCS door (Figure 7, Item 3) and secure DCS door latch (Figure 7, Item 4).
4. Install top body panel (WP 0028, Remove/Install Top Body Panel).
5. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
6. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
7. Start engine and check for proper operation (TM 9-6115-749-10).
8. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
REMOVE/INSTALL AIR INTAKE HOSE ASSEMBLIES

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
Clamp, Vise-Grip, 11" Swivel Pad, Weld Type (WP 0162, Table 2, Item 9)

Materials/Parts

Clamp (4) (WP 0106, Item 4)
Clamp (WP 0106, Item 8)
Elbow, hose (WP 0106, Item 5)
Tubing, metallic (WP 0106, Item 6)
Tubing, nonmetallic (WP 0106, Item 9)
Grease, electrically conductive (WP 0163, Table 1, Item 20)
Rag, wiping (WP 0163, Table 1, Item 31)

Personnel Required

91D (1)
Assistant (1)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)
Top body panel removed (WP 0028, Remove/Install Top Body Panel)

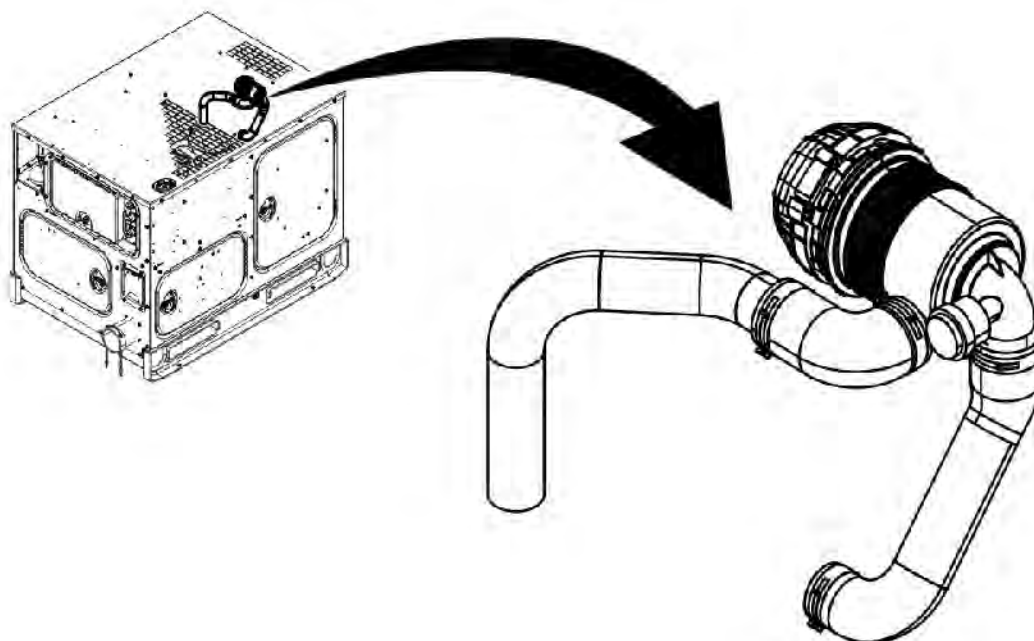
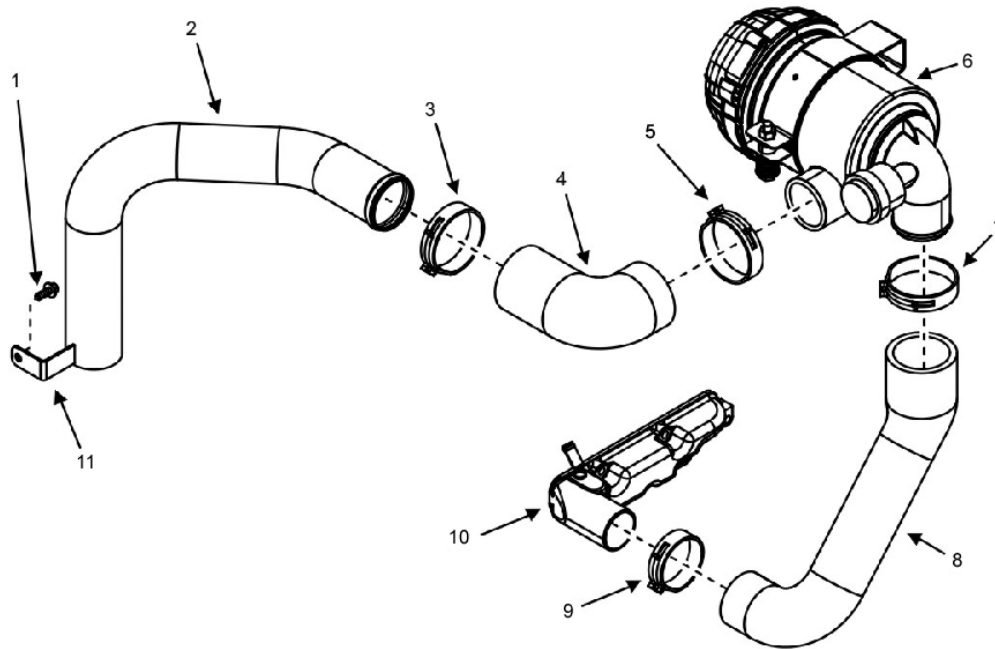
REMOVE/INSTALL AIR HOSE ASSEMBLIES**Remove Air Intake Air Hose Assemblies**

Figure 1. Air Intake Hose Assembly - Location.

1. Ensure equipment conditions are met in order presented in initial setup.

REMOVE/INSTALL AIR HOSE ASSEMBLIES – CONTINUED

2. Locate all parts and connectors for air intake hose assembly (Figure 1).
3. Disengage clamp (Figure 2, Item 5) securing hose elbow (Figure 2, Item 4) to upper tube of air cleaner assembly (Figure 2, Item 6).

**Figure 2. Air Intake Hose Assembly - Detail.**

4. Remove hose elbow (Figure 2, Item 4) and clamp (Figure 2, Item 5) from air cleaner assembly (Figure 2, Item 6).
5. Remove hex socket head screw (Figure 2, Item 1) securing open end of metallic tubing (Figure 2, Item 2) to unit interior panel (not shown).
6. Remove hose elbow (Figure 2, Item 4), metallic tubing (Figure 2, Item 2), and clamps (Figure 2, Items 3 and 5) from unit, and place on a suitable work surface.
7. Disengage clamp (Figure 2, Item 7) and nonmetallic tubing (Figure 2, Item 8) from air cleaner assembly (Figure 2, Item 6).
8. Disengage clamp (Figure 2, Item 9) securing nonmetallic tubing (Figure 2, Item 8) to intake manifold (Figure 2, Item 10).
9. Remove nonmetallic tubing (Figure 2, Item 8) and clamps (Figure 2, Items 7 and 9) from unit, and place on a suitable work surface.

END OF TASK**Inspect Air Intake Hose Assemblies**

1. Inspect all hoses (Figure 2, Items 4 and 8) and metallic tubing (Figure 2, Item 2) for damage or deterioration, and replace damaged or deteriorated parts as required.
2. Inspect hose elbow (Figure 2, Item 4), nonmetallic tubing (Figure 2, Item 8), and metallic tubing (Figure 2, Item 2) and remove any blockage such as debris, dirt, or kinks, or replace hose if blockage cannot be removed.

REMOVE/INSTALL AIR HOSE ASSEMBLIES – CONTINUED

3. Inspect all clamps (Figure 2, Items 3, 5, 7, 9) for corrosion or damage, and replace as required.

END OF TASK**Install Air Intake Hose Assemblies****NOTE**

Wipe down air intake hoses, tubing, and clamps with wiping rag prior to installation.

1. Position hose elbow (Figure 2, Item 4) and clamp (Figure 2, Item 5) to mounting location on air cleaner assembly (Figure 2, Item 6) but do not secure hose clamp (Figure 2, Item 5).
2. Install bracket (Figure 2, Item 11) at open end of metallic tubing (Figure 2, Item 2) to mounting location on unit interior panel (not shown) using one hex socket head screw (Figure 2, Item 1).
3. Secure clamp (Figure 2, Item 3) on metallic tubing (Figure 2, Item 2) at hose elbow (Figure 2, Item 4).
4. Position nonmetallic tubing (Figure 2, Item 8) and clamp (Figure 2, Item 9) at mounting location on intake manifold (Figure 2, Item 10), but do not secure clamp (Figure 2, Item 9).
5. Position nonmetallic tubing (Figure 2, Item 8) and clamp (Figure 2, Item 7) to mounting location on air cleaner assembly (Figure 2, Item 6), but do not secure clamp.
6. Verify proper position of nonmetallic tubing (Figure 2, Item 8), and secure clamps (Figure 2, Items 7 and 9).
7. Install top body panel (WP 0028, Remove/Install Top Body Panel).
8. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
9. Close generator set doors.
10. Start engine and check for proper operation (TM 9-6115-749-10).
11. Bring coolant to normal operating temperature and then apply a 100% rated load for 30 minutes (TM 9-6115-749-10).
12. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
SERVICE AIR CLEANER ASSEMBLY

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Materials/Parts

Element, air filter (WP 0106, Item 2)
Grease, electrically conductive (WP 0163, Table 1, Item 20)
Rag, wiping (WP 0163, Table 1, Item 31)
Sealant (WP 0163, Table 1, Item 32)

Personnel Required

91D (1)
Assistant (1)

References

WP 0019, Remove/Install Air Intake Hose Assemblies

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Air filter restriction indicator shows restricted filter (TM 9-6115-749-10)
Battery ground cable removed (WP 0036, Remove/Install Batteries)
Top body panel removed (WP 0028, Remove/Install Top Body Panel)

SERVICE AIR CLEANER ASSEMBLY**WARNING**

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

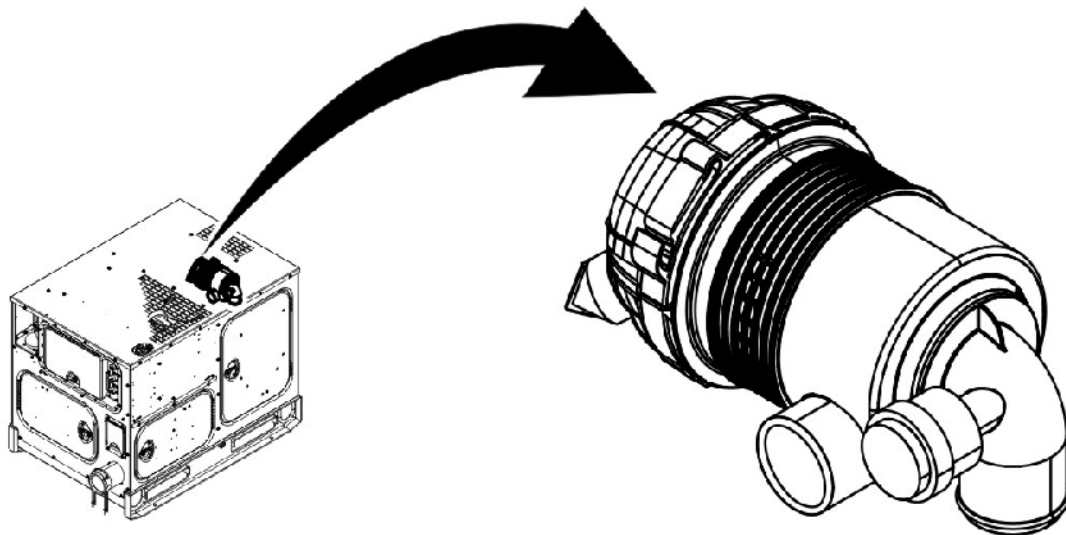
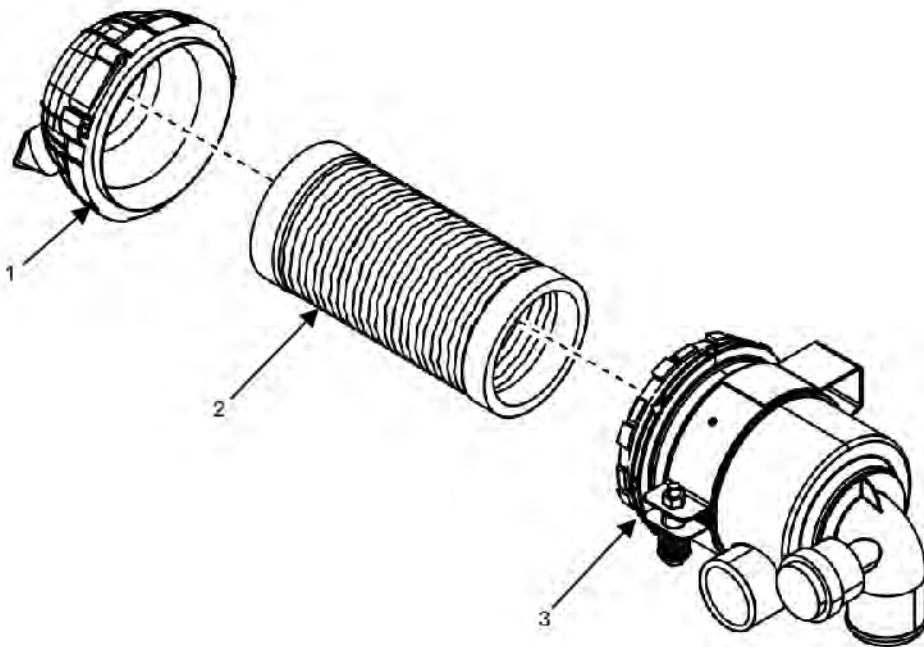
Remove Air Cleaner Filter Element

Figure 1. Air Cleaner - Location.

SERVICE AIR CLEANER ASSEMBLY – CONTINUED

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate air cleaner assembly (Figure 1) attached to back side of unit weather shield.
3. Release lock lever on air cleaner assembly base cover (Figure 2, Item 1), and twist base cover counter-clockwise until resistance is felt.
4. Pull base cover (Figure 2, Item 1) straight out to expose filter element (Figure 2, Item 2), and remove base cover (Figure 2, Item 1) from unit.
5. Inspect base cover (Figure 2, Item 1) for damage or corrosion, and replace as required.
6. Turn end of filter element (Figure 2, Item 2) in either direction to disengage seal.
7. Remove filter element (Figure 2, Item 2) from air cleaner assembly (Figure 2, Item 3) by gently pulling outward, then discard element.
8. Inspect air cleaner assembly (Figure 2, Item 3) for damage or corrosion, and replace as required. See Remove Air Cleaner Assembly task and Install Air Cleaner Assembly task.

END OF TASK**Install Air Cleaner Filter Element****Figure 2. Air Cleaner Assembly.**

1. Remove dirt and debris from base cover (Figure 2, Item 1), sealing surfaces, and inside of air cleaner assembly (Figure 2, Item 3).
2. Insert new filter element (Figure 2, Item 2) into air cleaner assembly (Figure 2, Item 3) and twist in either direction to secure.

NOTE

When base cover is placed on air cleaner assembly and turned clockwise, a click can be heard when the cover is properly secured.

3. Position base cover (Figure 2, Item 1) on housing mount, and turn clockwise to secure.

SERVICE AIR CLEANER ASSEMBLY – CONTINUED**NOTE**

Restriction indicator on air cleaner assembly should be reset only after a new air filter has been installed.

4. Reset restriction indicator (Figure 3, Item 6) on air cleaner assembly (Figure 3, Item 9) by pressing large yellow button on top of restriction indicator (Figure 3, Item 6).

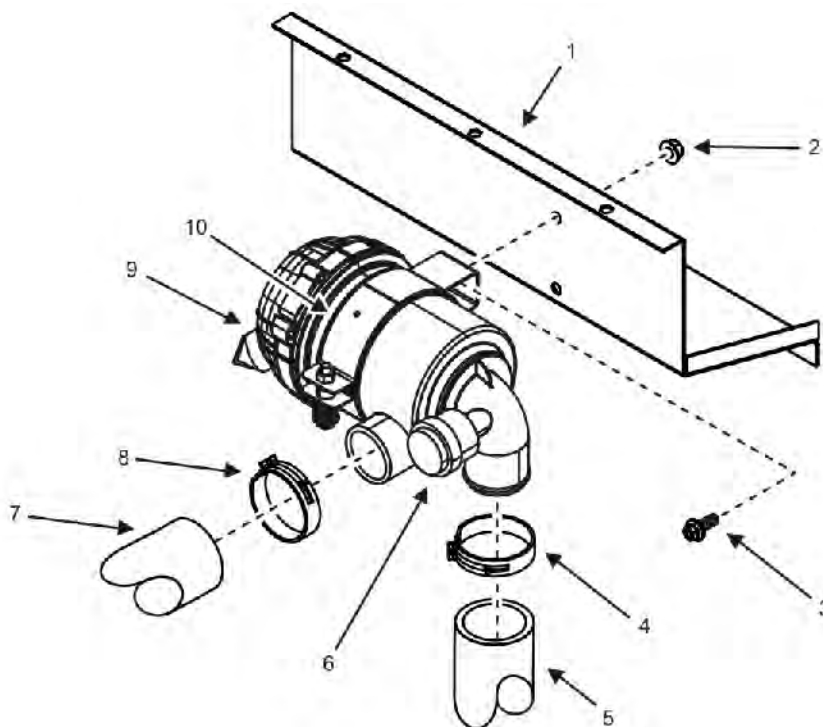
END OF TASK**Remove Air Cleaner Assembly**

Figure 3. Air Cleaner Assembly and Mounting.

1. Remove air inlet hose (Figure 3, Item 7) connecting air cleaner assembly (Figure 3, Item 9) to inlet tube by releasing hose clamp (Figure 3, Item 8) at air cleaner assembly end of hose (WP 0019, Remove/Install Air Intake Hose Assemblies).
2. Remove air outlet hose (Figure 3, Item 5) connecting air cleaner assembly (Figure 3, Item 9) to inlet manifold by releasing hose clamp (Figure 3, Item 4) at air cleaner assembly end of hose.

CAUTION

Removing the nuts holding the air cleaner bracket to the weather shield will leave the screws free to come out of the bracket. Care should be taken that screw(s) are not dropped into the engine. Failure to comply may cause damage to equipment.

3. Disconnect air cleaner bracket (Figure 3, Item 10) from weather shield (Figure 3, Item 1) by removing two flange nuts (Figure 3, Item 2) and two flange head screws (Figure 3, Item 3) securing air cleaner bracket (Figure 3, Item 10) to weather shield (Figure 3, Item 1).
4. Remove air cleaner assembly (Figure 3, Item 9) and air cleaner bracket (Figure 3, Item 10) from unit and place on suitable work surface.

SERVICE AIR CLEANER ASSEMBLY – CONTINUED

5. Inspect air cleaner assembly (Figure 3, Item 9) and air cleaner bracket (Figure 3, Item 10) for damage or corrosion, and replace as required.
6. Inspect hose clamps (Figure 3, Items 4 and 8) for damage or corrosion, and replace as required.

END OF TASK**Install Air Cleaner Assembly**

1. Position air cleaner assembly (Figure 3, Item 9) and air cleaner bracket (Figure 3, Item 10) to mounting location on weather shield (Figure 3, Item 1).
2. Secure air cleaner bracket (Figure 3, Item 10) and air cleaner assembly (Figure 3, Item 9) to weather shield (Figure 3, Item 1) by installing two flange head screws (Figure 3, Item 3) and two flange nuts (Figure 3, Item 2).

NOTE

Wipe down air cleaner assembly hoses, parts, and connectors with wiping rag prior to installation.

3. Rotate air cleaner assembly (Figure 3, Item 9) within the air cleaner bracket (Figure 3, Item 10) as necessary to align air cleaner inlet opening with air inlet hose (Figure 3, Item 7).
4. Install air inlet hose (Figure 3, Item 7) on air cleaner assembly (Figure 3, Item 9), and reposition hose clamp (Figure 3, Item 8) to secure air inlet hose (Figure 3, Item 7) (WP 0019, Remove/Install Air Intake Hose Assemblies).
5. Install air outlet hose (Figure 3, Item 5) on air cleaner assembly (Figure 3, Item 9), and reposition hose clamp (Figure 3, Item 4) to secure air outlet hose (Figure 3, Item 5) (WP 0019, Remove/Install Air Intake Hose Assemblies).
6. Close generator set doors.
7. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
8. Start engine and check for proper operation (TM 9-6115-749-10). Bring coolant to normal operating temperature and then apply a 100% rated load for 30 minutes (TM 9-6115-749-10).
9. Repair as required.

END OF TASK

SERVICE AIR CLEANER ASSEMBLY – CONTINUED

Disassemble Air Cleaner Assembly

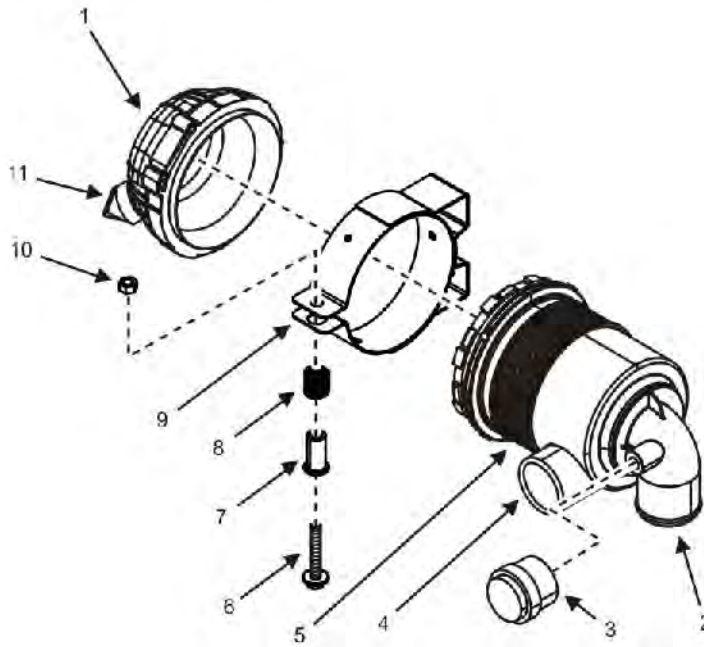


Figure 4. Air Cleaner Assembly - Detail.

1. Remove air cleaner assembly (Figure 3, Item 9) and air cleaner bracket (Figure 3, Item 10) from unit weather shield (Figure 3, Item 1). See Remove Air Cleaner Assembly task.
2. Remove air cleaner filter element (Figure 2, Item 2). See Remove Air Cleaner Filter Element task.
3. Rotate air filter restriction indicator (Figure 4, Item 3) counterclockwise from elbow (Figure 4, Item 2) of air cleaner housing (Figure 4, Item 4) to remove air filter restriction indicator (Figure 4, Item 3) from air cleaner housing (Figure 4, Item 4).
4. Inspect air filter restriction indicator (Figure 4, Item 3) for excessive corrosion or other signs of damage, and replace as required.
5. Remove nut (Figure 4, Item 10), spring (Figure 4, Item 8), spacer (Figure 4, Item 7), and bolt (Figure 4, Item 6) securing air cleaner mounting bracket (Figure 4, Item 9) to air cleaner housing (Figure 4, Item 4).
6. Inspect air cleaner hardware for corrosion and other signs of obvious damage. Replace as required.
7. Remove mounting bracket (Figure 4, Item 9) from air cleaner housing (Figure 4, Item 4) by expanding mounting bracket (Figure 4, Item 9) to slide over air cleaner housing end (Figure 4, Item 5).
8. Inspect mounting bracket (Figure 4, Item 9) for corrosion, cracks, or other signs of obvious damage, and replace as required.
9. Remove dust ejection valve (Figure 4, Item 11) from air cleaner base (Figure 4, Item 1).
10. Inspect dust ejection valve (Figure 4, Item 11) for corrosion, cracks, or other signs of obvious damage. Replace as required.

END OF TASK

Assemble Air Cleaner Assembly

1. Clean all air cleaner assembly components thoroughly before reassembling.

SERVICE AIR CLEANER ASSEMBLY – CONTINUED

2. Install dust ejection valve (Figure 4, Item 11) on air cleaner base (Figure 4, Item 1).
3. Place air cleaner housing (Figure 4, Item 4) into mounting bracket (Figure 4, Item 9).

NOTE

Spacer and spring are installed on the bolt outside the strap, next to the bolt head.

4. Secure mounting bracket (Figure 4, Item 9) to air cleaner housing (Figure 4, Item 4) using bolt (Figure 4, Item 6), spacer (Figure 4, Item 7), spring (Figure 4, Item 8), and nut (Figure 4, Item 10).
5. Secure bolt (Figure 4, Item 6) finger-tight to allow rotation of air cleaner assembly housing (Figure 4, Item 4) during installation of air hoses.
6. Apply thread sealant to mounting threads of air filter restriction indicator (Figure 4, Item 3).
7. Install and secure air filter restriction indicator (Figure 4, Item 3) on elbow (Figure 4, Item 2) of air cleaner housing (Figure 4, Item 4).
8. Install air cleaner filter element. See Install Air Cleaner Filter Element task.
9. Install air cleaner assembly (Figure 3, Item 9) onto unit weather shield (Figure 3, Item 1). See Install Air Cleaner Assembly task.
10. Install top body panel on generator set (WP 0028, Remove/Install Top Body Panel).
11. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
12. Close generator set doors.
13. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
14. Start engine and check for proper operation (TM 9-6115-749-10).
15. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

SERVICE COOLING SYSTEM

INITIAL SETUP:**Test Equipment**

Test Kit, Radiator Pressure (WP 0162, Table 2, Item 26)

Personnel Required

91D (1)
Assistant (1)

Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

References

MIL-C-0010597F(ME)
WP 0024, Remove/Install Radiator Hose and Tube Assemblies
WP 0027, Remove/Install Radiator
WP 0087, Lubrication Instructions

Materials/Parts

Antifreeze, ethylene glycol (WP 0163, Table 1, Item 2)
Cap set, protective (WP 0163, Table 1, Item 8)
Cleaning compound, engine cooling system (WP 0163, Table 1, Item 9)
Distilled water (WP 0163, Table 1, Item 17)
Rag, wiping (WP 0163, Table 1, Item 31)
Sealant (WP 0163, Table 1, Item 32)
Strap, tiedown (WP 0163, Table 1, Item 34)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)
Top body panel removed (WP 0028, Remove/Install Top Body Panel)

SERVICE COOLING SYSTEM**WARNING**

Hot coolant can burn. If the radiator cap is hot to the touch, it is too hot to open. Allow the coolant to cool before opening the radiator cap. Wear gloves, additional protective clothing, and goggles as required. Contact with high-pressure steam and/or liquids can cause burns and scalding. Failure to comply may cause injury or death to personnel.

WARNING

Engine coolant is toxic to eyes and poisonous if ingested. Eye protection is required when working with engine coolant. Avoid repeated or prolonged contact. Failure to comply may cause injury or death to personnel.

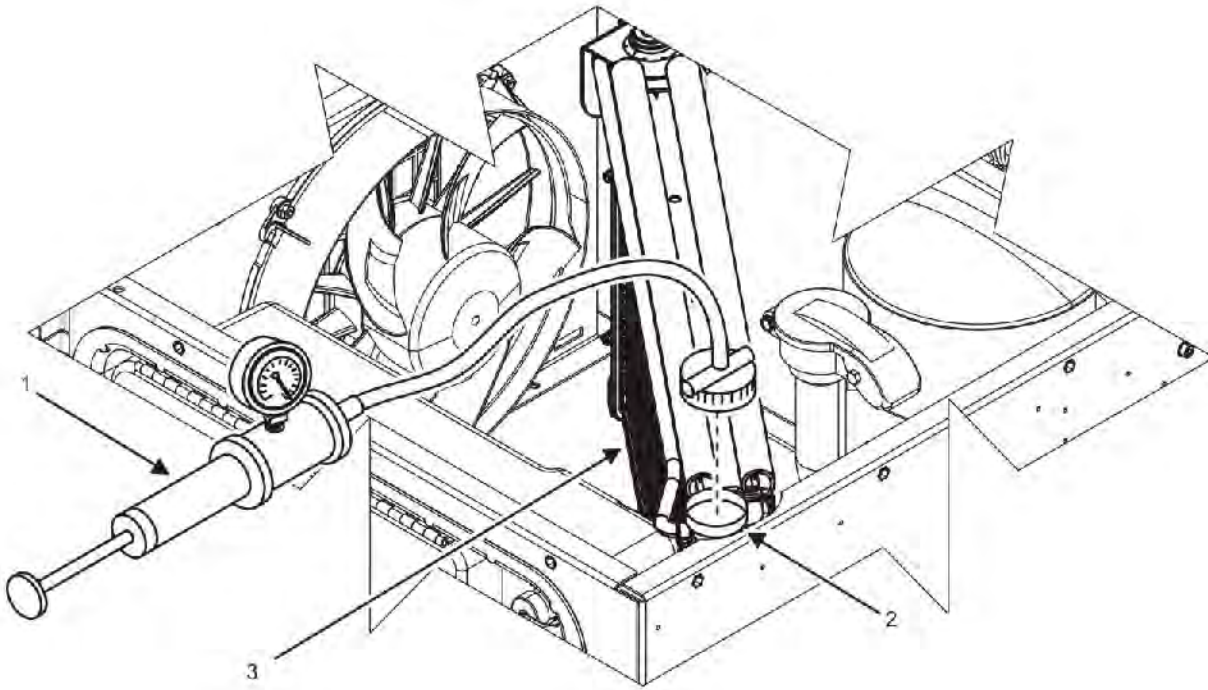
SERVICE COOLING SYSTEM – CONTINUED**Test Cooling System**

Figure 1. Cooling System Test - Radiator.

NOTE

Dispose of captured coolant IAW local SOP.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Ensure radiator (Figure 1, Item 3) is filled with engine coolant to proper level. See Fill Radiator with Engine Coolant task.
3. Remove radiator cap (Figure 3, Item 1) from radiator (Figure 1, Item 3).
4. Install radiator cap (Figure 3, Item 1) onto a cooling system tester (Figure 1, Item 1).
5. Apply 10.8-14.8 psi (75-105 kPa) to radiator cap.
6. Replace radiator cap (Figure 3, Item 1) if relief valve fails to open when pressure is above 13 psi (89.6 kPa).
7. Remove radiator cap (Figure 3, Item 1) from cooling system tester (Figure 1, Item 1).
8. Install cooling system tester to fill port (Figure 1, Item 2) on top of radiator.
9. Apply 10.8-14.8 psi (75-105 kPa) to radiator via fill port (Figure 1, Item 2).

NOTE

If pressure reading drops when applied to the radiator, the engine cooling system is leaking. Be sure to check radiator, hoses, and clamps when inspecting system for leaks.

10. Inspect cooling system for leaks in radiator hoses and around clamps (WP 0024, Remove/Install Radiator Hose and Tube Assemblies) if pressure reading drops after applying pressure to radiator (Figure 1, Item 3).
11. Remove and replace radiator (Figure 1, Item 3) if leaking (WP 0027, Remove/Install Radiator).

SERVICE COOLING SYSTEM – CONTINUED

12. Remove and replace any hoses or clamps (WP 0024, Remove/Install Radiator Hose and Tube Assemblies) where leaks are found.
13. Remove cooling system tester (Figure 1, Item 1) from fill port (Figure 1, Item 2).

CAUTION

Be sure to close radiator cap securely. If radiator cap is loose or improperly closed, coolant may leak, causing engine to overheat. Failure to comply may cause damage to equipment.

14. Install radiator cap (Figure 3, Item 1) to radiator fill port (Figure 1, Item 2).

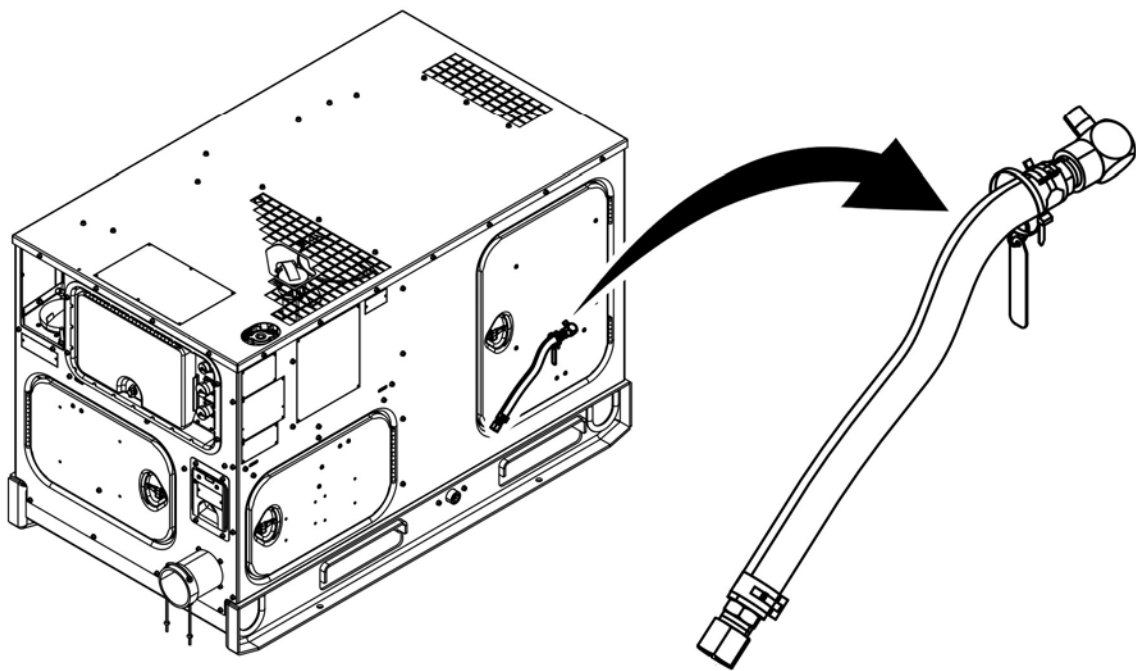
Drain Engine Coolant

Figure 2. Coolant Drain Line - Location.

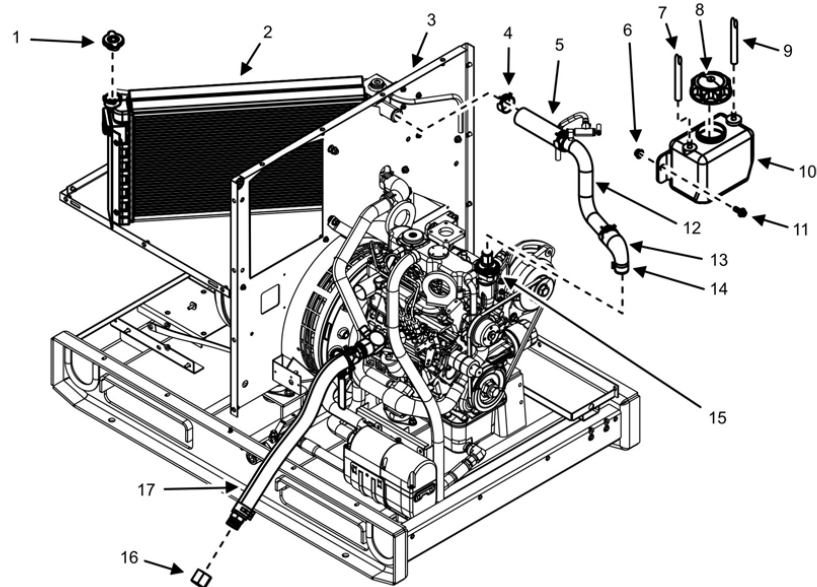
NOTE

The AMMPS 5 kW generator set is shipped from the factory filled with commercial-grade coolant. The color of the commercial-grade coolant may be different from the Mil-Standard coolant with which you are familiar.

The commercial-grade coolant is compatible with the Mil-Standard coolant specified in this manual. Mil-Standard coolant may be used to fill coolant level prior to the first maintenance interval. Commercial-grade coolant should be drained and replaced with Mil-Standard coolant as directed at the first maintenance interval.

1. Drain coolant from engine:
 - a. Open left-side door on generator set.
 - b. Open right-side door on generator set to locate coolant drain line (Figure 2).

SERVICE COOLING SYSTEM – CONTINUED

Legend

1	Radiator Cap	7	Recovery Hose	13	Hose
2	Radiator	8	Coolant Bottle Cap	14	Hose Clamp
3	Bulkhead Panel	9	Recovery Hose Cap	15	Thermostat
4	Hose Clamp	10	Coolant Recov- ery Bottle	16	Drain Hose Cap
5	Hose	11	Capscrew	17	Coolant Drain Hose
6	Nut	12	Tube		

Figure 3. Cooling System.

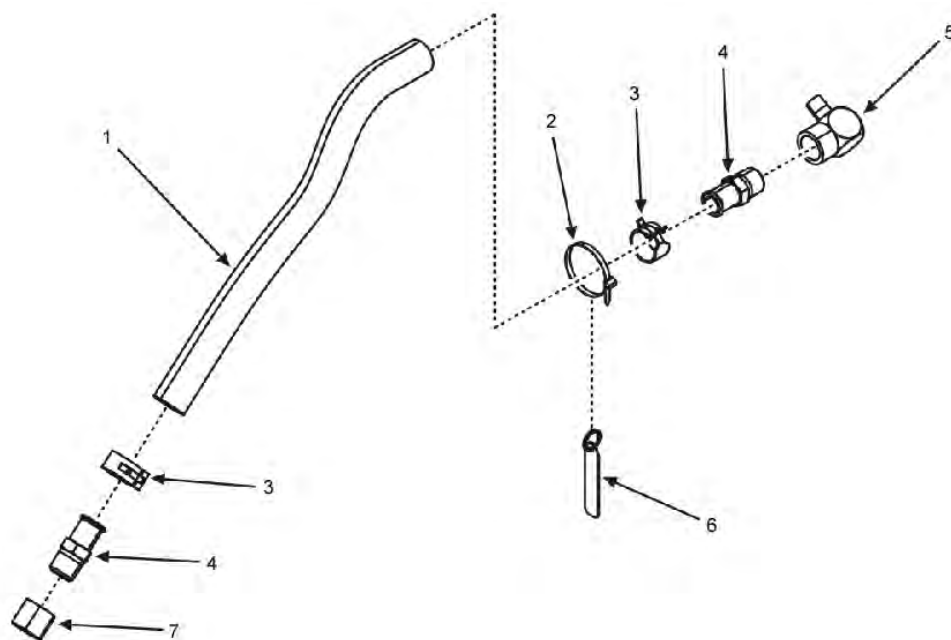
- c. Pull coolant drain hose (Figure 3, Item 17) through right-side door opening.
- d. Remove radiator cap (Figure 3, Item 1).

NOTE

Dispose of captured coolant IAW local SOP.

- e. Place a suitable container (minimum 2 gal (7.6 L) capacity) under end of coolant drain hose (Figure 3, Item 17).
 - f. Remove drain hose cap (Figure 3, Item 16) from end of coolant drain hose (Figure 3, Item 17), and allow coolant to drain into container.
 - g. Install drain hose cap (Figure 3, Item 16) when coolant flow has stopped running.
 - h. Inspect coolant drain hose assembly (Figure 3, Item 17) for signs of obvious damage.
 - i. Replace damaged components as required. See Step 2.
 - j. Store coolant drain hose assembly (Figure 3, Item 17) inside right-side of unit and close right-side door.
2. Repair coolant drain hose assembly.

SERVICE COOLING SYSTEM – CONTINUED

**Figure 4. Repair Coolant Drain Hose.**

- a. Reposition clamp (Figure 4, Item 3) to allow removal of hose assembly from tube adapter (Figure 4, Item 4). Remove hose assembly from tube adapter (Figure 4, Item 4).
- b. Remove tube adapter (Figure 4, Item 4) from elbow (Figure 4, Item 5).
- c. Remove elbow (Figure 4, Item 5) from engine oil pan.
- d. Disassemble coolant drain hose assembly into the following components:
 - (1) Tube adapter (1) (Figure 4, Item 4).
 - (2) Clamp (2) (Figure 4, Item 3).
 - (3) Cable tie (Figure 4, Item 2). Discard cable tie.
 - (4) Information coolant drain hose label (Figure 4, Item 6).
 - (5) Coolant drain hose (Figure 4, Item 1).
 - (6) Cap (Figure 4, Item 7).
- e. Discard and replace damaged component(s).
- f. Apply thread sealant to threads of tube adapter (Figure 4, Item 4), elbow (Figure 4, Item 5), and cap (Figure 4, Item 7) prior to assembly.
- g. Assemble cap (Figure 4, Item 7), tube adapter (Figure 4, Item 4), coolant drain hose (Figure 4, Item 1), two clamps (Figure 4, Item 3), new cable tie (Figure 4, Item 2), and information label (Figure 4, Item 6) into an assembly.
- h. Assemble tube adapter (Figure 4, Item 4) to elbow (Figure 4, Item 5).
- i. Install elbow (Figure 4, Item 5) to engine oil pan.

SERVICE COOLING SYSTEM – CONTINUED

- j. Install hose assembly to tube adapter (Figure 4, Item 4) and reposition clamp (Figure 4, Item 3) to secure hose assembly (Figure 3, Item 17).
3. Remove upper radiator hose assembly:
- a. Remove recovery hoses (Figure 3, Items 7 and 9) from top of coolant recovery bottle (Figure 3, Item 10) and cap/plug open hoses and fittings on coolant recovery bottle (Figure 3, Item 10).
 - b. Remove hose (Figure 3, Item 5) and tube (Figure 3, Item 12) assembly from radiator fitting (WP 0024, Remove/Install Radiator Hose and Tube Assemblies).
 - c. Drain coolant from hose (Figure 3, Item 5) and tube (Figure 3, Item 12) by bending hose (Figure 3, Item 13) at thermostat (Figure 3, Item 15) while holding container under open end of hose (Figure 3, Item 5).
 - d. Disengage hose clamp (Figure 3, Item 14) securing hose (Figure 3, Item 13) to thermostat (Figure 3, Item 15).

NOTE

Residual coolant may drain from hose (Figure 3, Item 13) when removed from thermostat housing.

- e. Remove hose (Figure 3, Item 13) from thermostat (Figure 3, Item 15) (WP 0024, Remove/Install Radiator Hose and Tube Assemblies).
 - f. Remove upper radiator hose assembly (Figure 3, Items 4, 5, 12, 13, and 14) from unit.
 - g. Cap/plug openings in radiator (Figure 3, Item 2) and thermostat (Figure 3, Item 15) to prevent dirt and debris from entering cooling system.
4. Inspect and install upper radiator hose assembly:
- a. Remove residual coolant from flexible hose fittings on radiator (Figure 3, Item 2) and thermostat (Figure 3, Item 15) using scale remover and wiping rag.
 - b. Inspect two hoses (Figure 3, Items 5 and 13) and tube (Figure 3, Item 12) for damage, deterioration, and/or obstruction.
 - c. Remove any obstructions in hoses (Figure 3, Items 5 and 13), and replace damaged tube (Figure 3, Item 12) or hoses (Figure 3, Items 5 and 13) as required.
 - d. Inspect hose clamps (Figure 3, Items 4 and 14) for excessive corrosion or signs of damage and replace as required.
 - e. Remove caps/plugs from the fittings prior to installation of hoses.

NOTE

Wipe down hoses, parts, and connectors with wiping rag prior to installation.

- f. Install upper radiator hose assembly (Figure 3, Items 4, 5, 12, 13, and 14) to radiator (Figure 3, Item 2) and thermostat (Figure 3, Item 15) (WP 0024, Remove/Install Radiator Hose and Tube Assemblies).
5. Clean coolant recovery bottle:
- a. Place suitable container and wiping rag by coolant recovery bottle (Figure 3, Item 10).
 - b. Remove two capscrews (Figure 3, Item 11) and two nuts (Figure 3, Item 6) securing coolant recovery bottle (Figure 3, Item 10) to bulkhead panel (Figure 3, Item 3).
 - c. Remove coolant recovery bottle (Figure 3, Item 10) from bulkhead panel (Figure 3, Item 3), and drain coolant from coolant recovery bottle (Figure 3, Item 10).

SERVICE COOLING SYSTEM – CONTINUED**NOTE**

Wipe down hoses, parts, and connectors with wiping rag prior to installation.

- d. Install coolant recovery bottle (Figure 3, Item 10) to bulkhead panel (Figure 3, Item 3) using two cap-screws (Figure 3, Item 11) and two nuts (Figure 3, Item 6).
- e. Install recovery hoses (Figure 3, Items 7 and 9) to coolant recovery bottle (Figure 3, Item 10).
- f. Install coolant bottle cap (Figure 3, Item 8) and secure tightly.
- g. Install radiator cap (Figure 3, Item 1) and secure tightly.
6. Complete the Clean Radiator Interior task followed by the Fill Radiator with Engine Coolant task if radiator requires flushing.
7. Move to Fill Radiator with Engine Coolant task if radiator does not require flushing.

END OF TASK**Clean Radiator Interior****WARNING**

Engine cooling system cleaning compound MIL-C-0010597F(ME) Cleaning Compound with Conditioner for Engine Cooling Systems will not be used as a routine maintenance procedure each time antifreeze is added or drained from the cooling system. The compound will be used only when necessary to clean heavily rusted or partially clogged cooling systems. Failure to comply may cause injury or death to personnel.

WARNING

Engine cleaning compound MIL-C-10597F (ME) for cooling systems is designed to clean the interiors of cooling systems, to neutralize residual cleaning acids, and to coat the interiors with a silicate. The engine cleaning compound is hazardous to personnel due to the nature of its use. Failure to comply may cause injury or death to personnel.

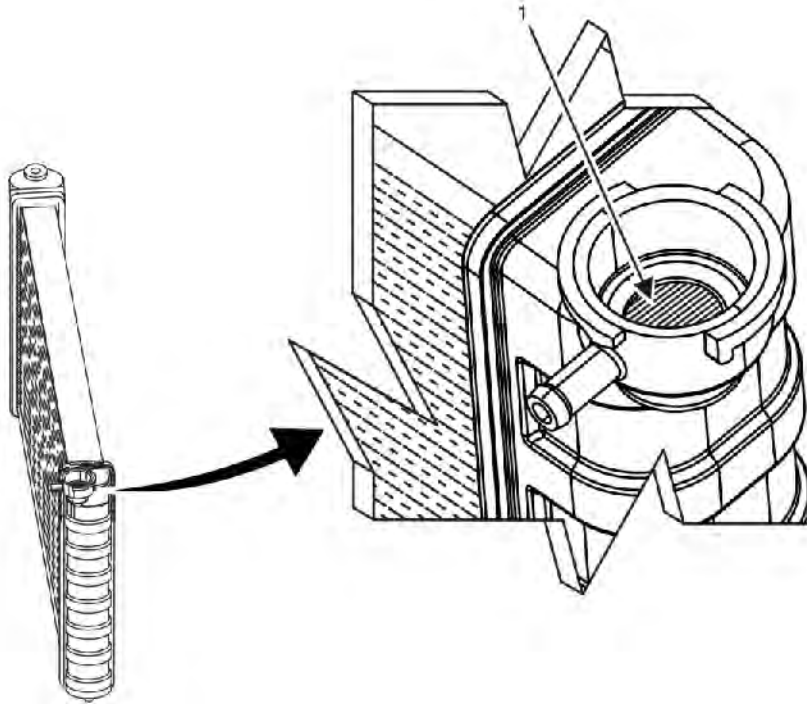
NOTE

The AMMPS 5 kW generator set is shipped from the factory filled with commercial-grade coolant. The color of the commercial-grade coolant may be different from the Mil-Standard coolant with which you are familiar.

The commercial-grade coolant is compatible with the Mil-Standard coolant specified in this manual. Therefore, Mil-Standard coolant may be used to fill coolant level prior to the first maintenance interval. Commercial-grade coolant should be drained and replaced with Mil-Standard coolant as directed at the first maintenance interval.

Dispose of captured coolant IAW local SOP.

1. Drain engine coolant if not already drained. See Drain Engine Coolant task.
2. Open all drain cocks and remove engine block drain when engine is stopped and temperature of coolant is considerably below 200 °F (93 °C).
3. Add clean water and, while doing so, start the engine at fast idle (drains open). Flush by continually flooding cooling system with clean water while engine is running for 25 min.
4. Stop engine, close all pet cocks, install engine block drain, refill with clean water, and maintain level in cooling system.
5. Fill cooling system with coolant mixture when cleaning cycle is finished. Complete Fill Radiator with Engine Coolant task.

SERVICE COOLING SYSTEM – CONTINUED**END OF TASK****Fill Radiator with Engine Coolant****Figure 5. Radiator Fill Port.****NOTE**

The AMMPS 5 kW generator set is shipped from the factory filled with commercial-grade coolant. The color of the commercial-grade coolant may be different from the Mil-Standard coolant with which you are familiar.

The commercial-grade coolant is compatible with the Mil-Standard coolant specified in this manual. Mil-Standard coolant may be used to fill coolant level prior to the first maintenance interval. Commercial-grade coolant should be drained and replaced with Mil-Standard coolant as directed at the first maintenance interval.

1. Remove radiator cap (Figure 3, Item 1) from radiator (Figure 3, Item 2).
2. Remove coolant bottle cap (Figure 3, Item 8) from coolant recovery bottle (Figure 3, Item 10).
3. Open pressure relief valve on upper radiator tube (Figure 3, Item 12) by lifting the relief valve lever 90° from position shown.
4. Add approved antifreeze mixture of 50% distilled water and 50% antifreeze (WP 0087, Lubrication Instructions) until the level reaches the LOW mark on the coolant recovery bottle (Figure 3, Item 10).

NOTE

Pour coolant slowly into the radiator to allow trapped air to escape.

5. Fill radiator (Figure 3, Item 2) antifreeze mixture until coolant level reaches the narrow opening at the bottom of the filler neck (Figure 5, Item 1).

SERVICE COOLING SYSTEM – CONTINUED**CAUTION**

Be sure to close radiator cap (Figure 3, Item 1) securely. If cap is loose or improperly closed, coolant may leak, causing engine to overheat. Failure to comply may cause damage to equipment.

6. Install radiator cap (Figure 3, Item 1) and tighten securely.
7. Install coolant bottle cap (Figure 3, Item 8) and tighten securely.
8. Return relief valve lever on upper radiator tube (Figure 3, Item 12) to original position as shown in Figure 3.
9. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
10. Close generator set doors.

WARNING

Starting engine when unit is partially disassembled is dangerous. Run engine in this condition only as long as required to test operation. Keep away from unprotected moving engine parts during operation. Failure to comply may cause injury or death to personnel.

11. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
12. Start engine and run for 5 min (TM 9-6115-749-10).
13. Inspect cooling system (Figure 3) for leaks. Repair as required.
14. Stop engine and let cool.
15. Check coolant level in coolant recovery bottle (Figure 3, Item 10) and add coolant mixture as required to bring level of coolant in bottle to LOW marking line.

CAUTION

Be sure to close radiator cap securely. If cap is loose or improperly closed, coolant may leak, causing engine to overheat. Failure to comply may cause damage to equipment.

16. Install top body panel (WP 0028, Remove/Install Top Body Panel).
17. Close right- and left-side doors.
18. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
19. Start engine and check for proper operation. Bring coolant to normal operating temperature and then apply a 100% rated load for 30 min (TM 9-6115-749-10).
20. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

REMOVE/INSTALL COOLANT RECOVERY SYSTEM

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Personnel Required

91D (1)
Assistant (1)

Materials/Parts

Hose, vent radiator (2) (WP 0108, Item 14)
Hose, vent radiator (WP 0108, Item 18)
Hose, vent radiator (WP 0108, Item 21)
Tank, coolant assembly (WP 0108, Item 23)
Antifreeze, ethylene glycol (WP 0163, Table 1, Item 2)
Rag, wiping (WP 0163, Table 1, Item 31)
Soap, Ivory (WP 0163, Table 1, Item 33)
Cap set, protective (WP 0163, Table 1, Item 8)

References

WP 0021, Service Cooling System

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)
Top body panel removed (WP 0028, Remove/Install Top Body Panel)

REMOVE/INSTALL COOLANT RECOVERY SYSTEM**WARNING**

Cooling system operates at high temperature and pressure. Contact with high-pressure steam and/or liquids can cause burns and scalding. Shut down generator set and allow system to cool before performing checks, services, and maintenance. Wear gloves, additional protective clothing, and goggles as required. Contact with high-pressure steam and/or liquids can cause burns and scalding. Failure to comply may cause injury or death to personnel.

WARNING

Hot coolant can burn. If the radiator cap is hot to the touch, it is too hot to open. Allow the coolant to cool before opening the radiator cap. Wear gloves, additional protective clothing, and goggles as required. Contact with high-pressure steam and/or liquids can cause burns and scalding. Failure to comply may cause injury or death to personnel.

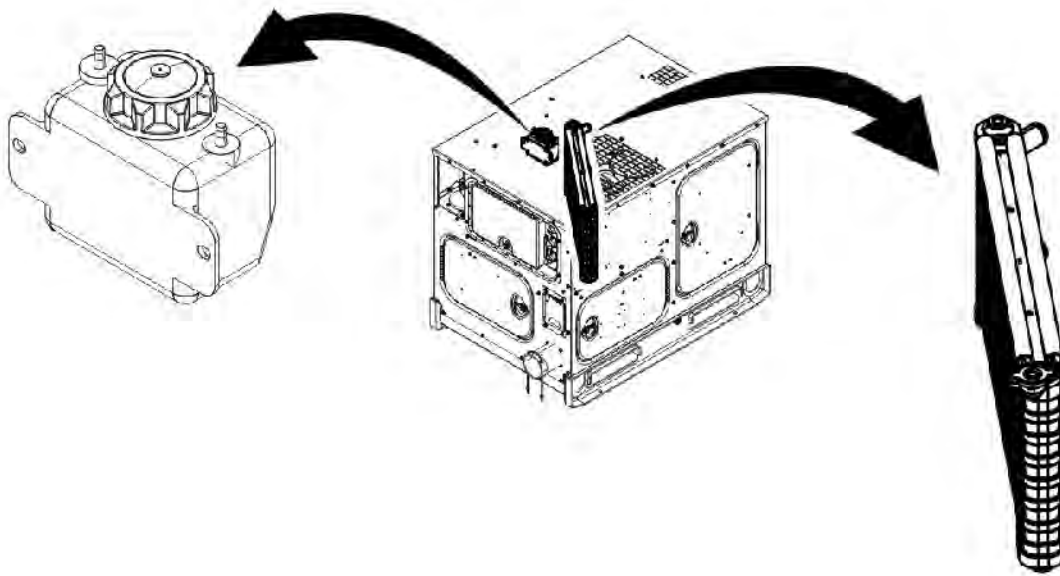
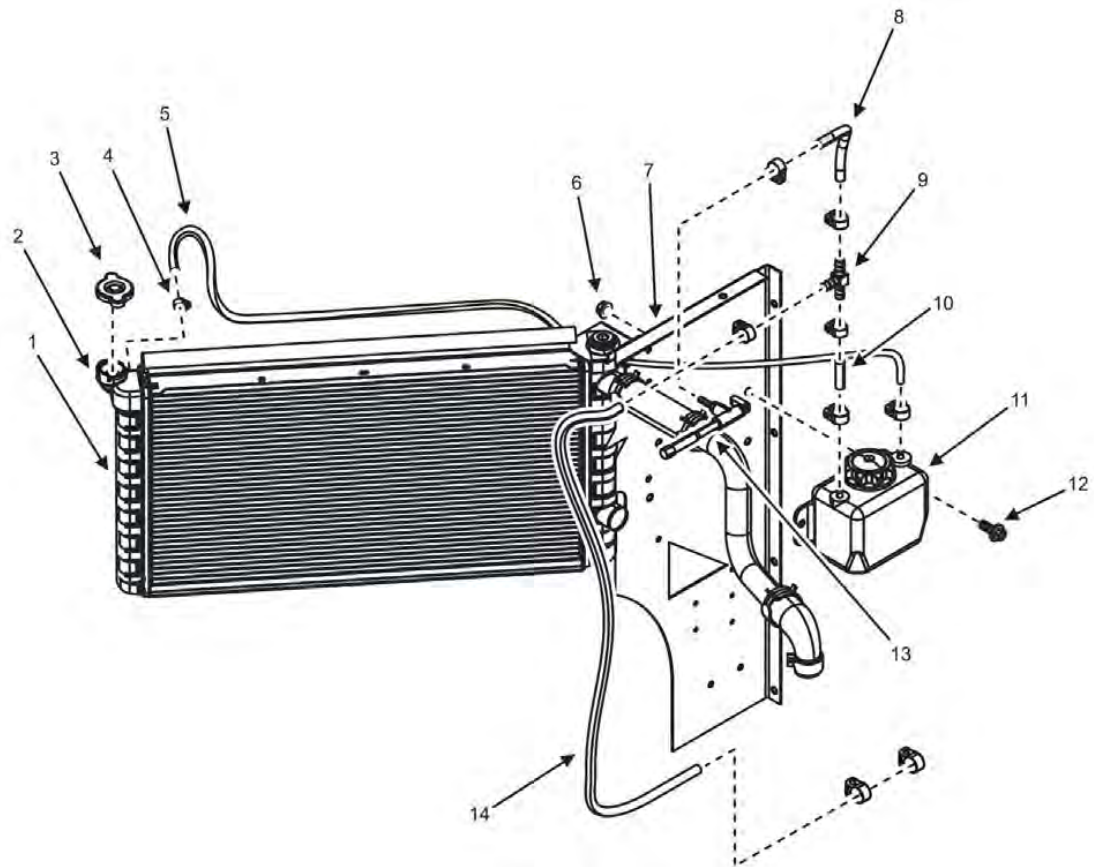
REMOVE/INSTALL COOLANT RECOVERY SYSTEM – CONTINUED**Remove Coolant Recovery System**

Figure 1. Coolant Recovery System - Location.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate coolant recovery system units (Figure 1).

REMOVE/INSTALL COOLANT RECOVERY SYSTEM – CONTINUED

**Figure 2. Coolant Recovery System.**

3. Place wiping rag over radiator cap (Figure 2, Item 3).
4. Turn radiator cap (Figure 2, Item 3) gently counterclockwise to first detent to relieve residual pressure in cooling system.
5. Turn radiator cap (Figure 2, Item 3) counterclockwise to second detent after pressure is relieved.
6. Remove radiator cap (Figure 2, Item 3) and cover radiator filler neck (Figure 2, Item 2).
7. Inspect radiator cap (Figure 2, Item 3) for damage or cracked gasket, and replace as required.

NOTE

Cap/plug all open coolant lines/fittings to prevent dirt and debris from entering the cooling system.

Dispose of captured coolant IAW local SOP.

8. Loosen two hose clamps (Figure 2, Item 4) and remove two radiator vent hoses (Figure 2, Items 5 and 10) from fittings on top of coolant tank assembly (Figure 2, Item 11).
9. Remove two screws (Figure 2, Item 12) and two nuts (Figure 2, Item 6) securing coolant tank assembly to engine side of internal bulkhead panel (Figure 2, Item 7).
10. Remove coolant tank assembly (Figure 2, Item 11) from unit, and set hardware aside for reuse.

REMOVE/INSTALL COOLANT RECOVERY SYSTEM – CONTINUED

11. Loosen hose clamp (Figure 2, Item 4) of long radiator vent hose (Figure 2, Item 5) from hose fitting at radiator filler neck (Figure 2, Item 2).
12. Remove rubber edge bulb seal (not shown) containing long radiator vent hose (Figure 2, Item 5) from top of radiator (Figure 2, Item 1), and extract long radiator vent hose (Figure 2, Item 5) from inside seal.
13. Extract long radiator vent hose (Figure 2, Item 5) by feeding hose through opening in internal bulkhead panel (Figure 2, Item 7), and place hose on a suitable work surface.
14. Loosen hose clamp (Figure 2, Item 4) and remove radiator vent hose (Figure 2, Item 8) from pressure relief valve (Figure 2, Item 13).
15. Loosen hose clamp (Figure 2, Item 4) and remove draining radiator vent hose (Figure 2, Item 14) from T-fitting (Figure 2, Item 9).
16. Remove T-fitting (Figure 2, Item 9) and two radiator vent hoses (Figure 2, Items 8 and 10) from unit, and place parts on a suitable work surface.
17. Loosen two hose clamps (Figure 2, Item 4) at unit skid, and remove draining radiator vent hose (Figure 2, Item 14) from unit, and place hose on a suitable work surface.
18. Loosen two hose clamps (Figure 2, Item 4) and remove two radiator vent hoses (Figure 2, Items 8 and 10) from T-fitting (Figure 2, Item 9).
19. Inspect coolant tank assembly (Figure 2, Item 11) for damage, and replace as required.
20. Inspect all radiator vent hoses (Figure 2, Items 5, 8, 10, and 14) for damage, and replace as required.
21. Inspect radiator (Figure 2, Item 1) for damage, and replace as required.

END OF TASK**Install Coolant Recovery System**

1. Position coolant tank assembly (Figure 2, Item 11) to its mounting location on internal bulkhead panel (Figure 2, Item 7).
2. Secure coolant tank assembly (Figure 2, Item 11) to internal bulkhead panel (Figure 2, Item 7) by installing two screws (Figure 2, Item 12) and two nuts (Figure 2, Item 6).

NOTE

Remove all caps/plugs from coolant lines prior to installation.

3. Attach two radiator vent hoses (Figure 2, Items 5 and 10) to fittings on top of coolant tank assembly (Figure 2, Item 11). Secure two radiator vent hoses (Figure 2, Items 5 and 10) with two hose clamps (Figure 2, Item 4).
4. Place free end of long radiator vent hose (Figure 2, Item 5) through opening in internal bulkhead panel (Figure 2, Item 7), and carefully pull hose through opening.
5. Place free end of long radiator vent hose (Figure 2, Item 5) inside rubber edge bulb seal (not shown) from top of radiator (Figure 2, Item 1), and feed hose through opening in seal.
6. Lubricate hose fitting on radiator filler neck (Figure 2, Item 2) with lubricating coolant to facilitate future removal.
7. Attach long radiator vent hose (Figure 2, Item 5) to fitting on radiator filler neck (Figure 2, Item 2). Secure hose with hose clamp (Figure 2, Item 4).
8. Attach rubber edge bulb seal (not shown) to top of radiator (Figure 2, Item 1), being careful not to damage long radiator vent hose (Figure 2, Item 5) inside seal.
9. Attach T-fitting (Figure 2, Item 9) to radiator vent hose (Figure 2, Item 10) on coolant tank assembly (Figure 2, Item 11).

REMOVE/INSTALL COOLANT RECOVERY SYSTEM – CONTINUED

10. Attach radiator vent hose (Figure 2, Item 8) to T-fitting (Figure 2, Item 9) and pressure relief valve (Figure 2, Item 13). Secure two hoses with two hose clamps (Figure 2, Item 4).
11. Attach draining radiator vent hose (Figure 2, Item 14) to last fitting of T-fitting (Figure 2, Item 9), and secure hose with hose clamp (Figure 2, Item 4).
12. Position draining radiator vent hose (Figure 2, Item 14) at bottom of skid, and secure with two hose clamps (Figure 2, Item 4).
13. Fill cooling system (WP 0021, Service Cooling System); ensure a mixture of one half clean water and one half engine coolant fills coolant tank assembly (Figure 2, Item 11) up to level of LOW line.
14. Install and secure radiator cap (Figure 2, Item 3).
15. Install and secure lid on coolant tank assembly (Figure 2, Item 11).
16. Close generator set doors.

WARNING

Starting engine when unit is partially disassembled is dangerous. Run engine in this condition only as long as required to test operation. Keep away from unprotected moving engine parts during operation. Failure to comply may cause injury or death to personnel.

CAUTION

Operating generator set with doors open or with panels removed for an extended length of time will cause engine to overheat. Do not operate generator with doors open or panels removed for longer than necessary to complete your task. Monitor DCS temperature indicator to prevent engine overheating. Failure to comply will cause damage to equipment.

NOTE

Running the engine will reveal any leaks in the coolant recovery lines.

17. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
18. Start engine (TM 9-6115-749-10), and run until fan cycles on and off two times.
19. Check all coolant hose fittings for leaks while engine is operating.
20. Turn engine OFF.
21. Allow engine to cool.
22. Check coolant level, and add coolant as required (WP 0021, Service Cooling System).
23. Install top body panel (WP 0028, Remove/Install Top Body Panel).
24. Close generator set doors.
25. Set engine control switch to PRIME & RUN.
26. Start engine and check for proper operation.
27. Repair as required.
28. Dispose of captured coolant IAW local SOP.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE
REMOVE/INSTALL COOLING FAN

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Personnel Required - cont'd

Assistant (1)

Materials/Parts

Fan, engine cooling (WP 0108, Item 38)
Grease, electrically conductive (WP 0163, Table 1, Item 20)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)
Top body panel removed (WP 0028, Remove/Install Top Body Panel)

Personnel Required

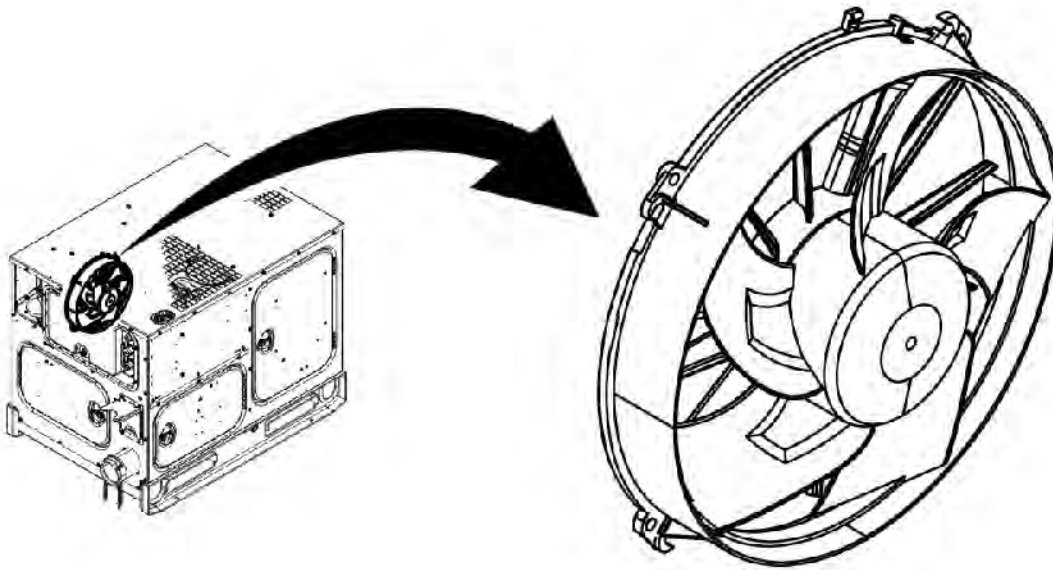
91D (1)

REMOVE/INSTALL COOLING FAN**WARNING**

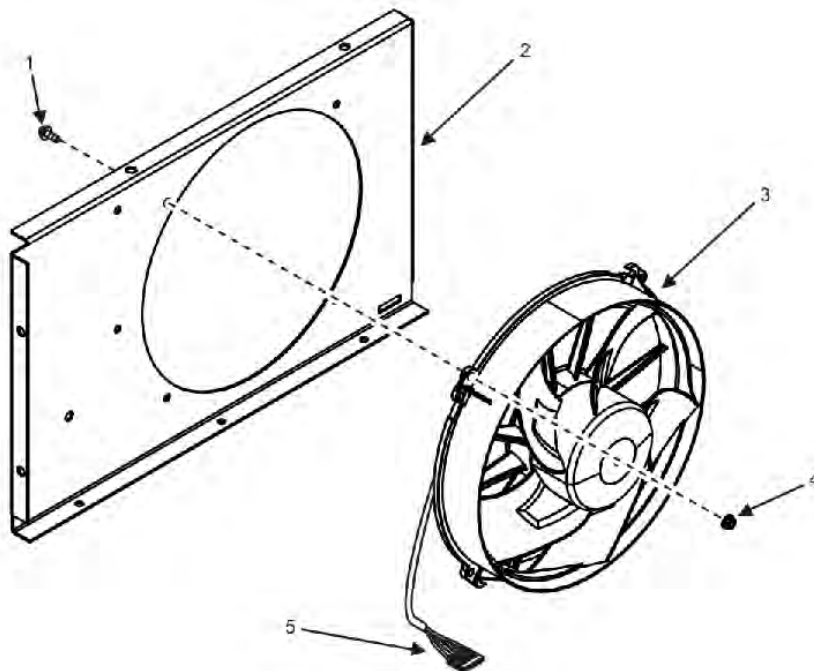
High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

WARNING

Cooling fan has sharp blades. Use caution and wear gloves when removing or installing fan. Failure to comply may cause injury or death to personnel.

REMOVE/INSTALL COOLING FAN – CONTINUED**Remove Cooling Fan****Figure 1. Cooling Fan - Location.**

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate cooling fan (Figure 1) at rear of unit.

**Figure 2. Cooling Fan - Details.**

3. Disconnect cooling fan electrical lead (Figure 2, Item 5) from unit wiring harness at connector.

REMOVE/INSTALL COOLING FAN – CONTINUED

4. Remove four flange head screws (Figure 2, Item 1) and four flange nuts (Figure 2, Item 4) securing cooling fan (Figure 2, Item 3) to fan support panel (Figure 2, Item 2).
5. Remove cooling fan (Figure 2, Item 3) from unit, and place on a suitable work surface.
6. Remove dirt and debris from surface of cooling fan (Figure 2, Item 3).

END OF TASK**Inspect Cooling Fan**

1. Inspect cooling fan (Figure 2, Item 3) for damage to fan guard and fan blades, and replace fan as required.
2. Inspect cooling fan electrical lead (Figure 2, Item 5) for cracked insulation, broken wires, or other signs of obvious damage, and replace fan as required.
3. Inspect fan support panel (Figure 2, Item 2) for excessive corrosion or other damage, and replace as required.
4. Inspect cooling fan mounting hardware for excessive corrosion or damage, and replace as required.

END OF TASK**Install Cooling Fan**

1. Position cooling fan (Figure 2, Item 3) on fan support panel (Figure 2, Item 2) with cooling fan electrical lead (Figure 2, Item 5) oriented at bottom of fan toward radiator support panel.
2. Align cooling fan mounting holes with mounting holes in fan support panel (Figure 2, Item 2).
3. Secure cooling fan (Figure 2, Item 3) to fan support panel (Figure 2, Item 2) using four flange head screws (Figure 2, Item 1) and four flange nuts (Figure 2, Item 4).
4. Connect cooling fan electrical lead (Figure 2, Item 5) to unit wiring harness at connector.
5. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
6. Install top body panel (WP 0028, Remove/Install Top Body Panel).
7. Close left-side door.
8. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
9. Start engine and check for proper operation (TM 9-6115-749-10).
10. Allow cooling fan to cycle on and off through two cycles to check for proper operation, and repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

REMOVE/INSTALL RADIATOR HOSE AND TUBE ASSEMBLIES

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Personnel Required

91D (1)
Assistant (1)

Materials/Parts

Elbow, coolant (WP 0108, Item 35)
Elbow, coolant hose (WP 0108, Item 29)
Elbow, coolant hose (WP 0108, Item 31)
Hose, coolant (WP 0108, Item 34)
Tube, water lower (WP 0108, Item 27)
Tube, water upper (WP 0108, Item 33)
Antifreeze, ethylene glycol (WP 0163, Table 1, Item 2)
Cap set, protective (WP 0163, Table 1, Item 8)
Cleaning compound, engine cooling system (WP 0163, Table 1, Item 9)
Distilled water (WP 0163, Table 1, Item 17)
Grease, electrically conductive (WP 0163, Table 1, Item 20)
Pan, drain (WP 0163, Table 1, Item 28)
Rag, wiping (WP 0163, Table 1, Item 31)

References

WP 0021, Service Cooling System
WP 0027, Remove/Install Radiator

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)
Top body panel removed (WP 0028, Remove/Install Top Body Panel)
Front body panel removed (WP 0029, Remove/Install Front Body Panel)

REMOVE/INSTALL RADIATOR HOSE AND TUBE ASSEMBLIES

WARNING

Hot coolant can burn. If the radiator cap is hot to the touch, it is too hot to open. Allow the coolant to cool before opening the radiator cap. Wear gloves, additional protective clothing, and goggles as required. Contact with high-pressure steam and/or liquids can cause burns and scalding. Failure to comply may cause injury or death to personnel.

WARNING

Engine coolant is toxic to eyes and poisonous if ingested. Eye protection is required when working with engine coolant. Avoid repeated or prolonged contact. Failure to comply may cause injury or death to personnel.

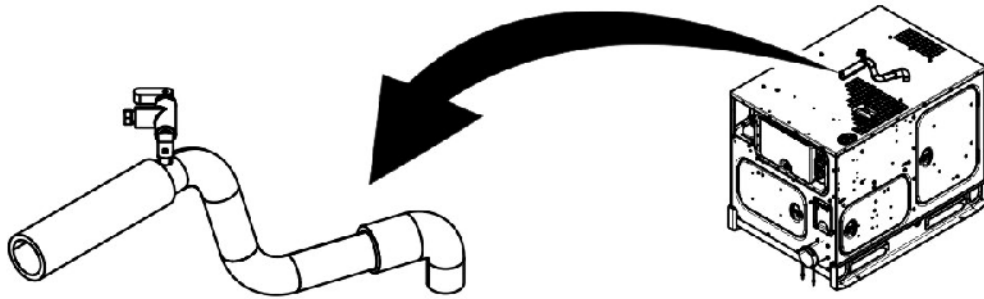
REMOVE/INSTALL RADIATOR HOSE AND TUBE ASSEMBLIES – CONTINUED**Remove Upper Radiator Hose Assembly**

Figure 1. Upper Radiator Hose Assembly - Location.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Open left- and right-side doors.
3. Locate upper radiator hose assembly (Figure 1).

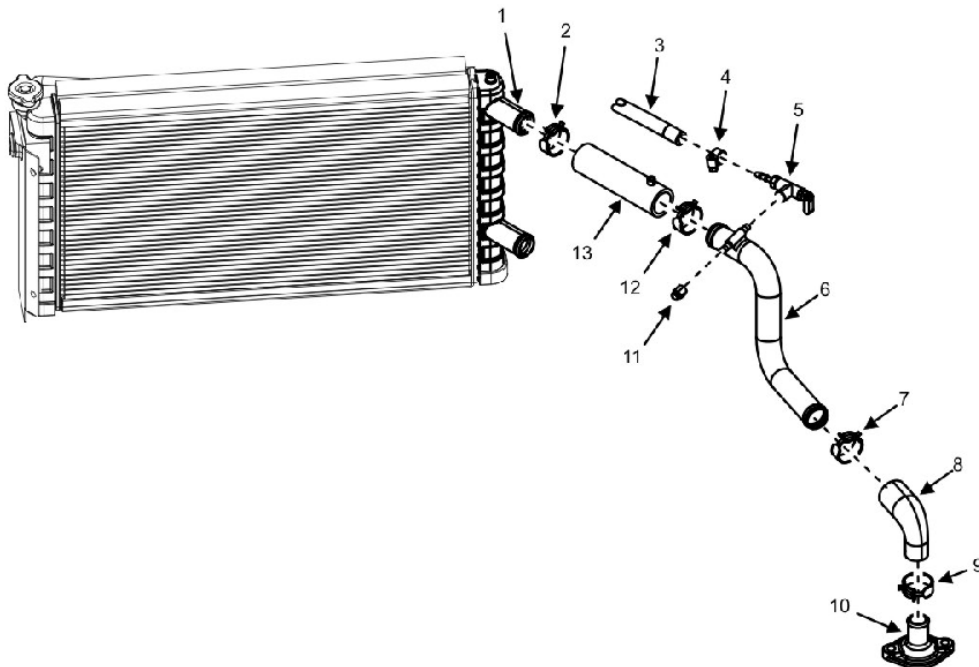


Figure 2. Upper Radiator Hose Assembly.

NOTE

Place a suitable container or rags under each hose connection prior to removal to capture any residual coolant that may be spilled when hoses are removed.

REMOVE/INSTALL RADIATOR HOSE AND TUBE ASSEMBLIES – CONTINUED

Cap/plug all open coolant hoses, ports, and fittings to prevent additional spillage and to prevent contamination from entering the cooling system.

4. Loosen hose clamp (Figure 2, Item 4) and remove hose (Figure 2, Item 3) from equalization valve (Figure 2, Item 5) on upper water tube (Figure 2, Item 6).
5. Loosen hose clamp (Figure 2, Item 9) at thermostat housing (Figure 2, Item 10), and remove coolant hose elbow (Figure 2, Item 8) from thermostat housing (Figure 2, Item 10).
6. Loosen hose clamp (Figure 2, Item 2) at upper port of radiator (Figure 2, Item 1), and remove coolant hose (Figure 2, Item 13) from radiator (Figure 2, Item 1).
7. Remove upper radiator hose assembly (Figure 1) from generator set, and place on a suitable work surface.
8. Remove two hose clamps (Figure 2, Items 2 and 12) and coolant hose (Figure 2, Item 13) from upper water tube (Figure 2, Item 6).
9. Remove two hose clamps (Figure 2, Items 7 and 9) and coolant hose elbow (Figure 2, Item 8) from upper water tube (Figure 2, Item 6).
10. Remove equalization valve (Figure 2, Item 5) and plug (Figure 2, Item 11) from upper water tube (Figure 2, Item 6).

END OF TASK**Inspect Upper Radiator Hose Assembly**

1. Inspect hose clamps (Figure 2, Items 2, 7, 9, and 12) and hose clamp (Figure 2, Item 4) for cracks, excessive corrosion, or other signs of obvious damage, and repair or replace as required.
2. Inspect hoses (Figure 2, Items 8 and 13) for firmness, cracks, wear, or other signs of obvious damage, and repair or replace as required.
3. Remove any scale from all hose ends with scale-removing compound and wiping rag prior to installation.
4. Inspect equalization valve (Figure 2, Item 5) and plug (Figure 2, Item 11) for damage. Replace components as required.
5. Inspect upper water tube (Figure 2, Item 6) for cracks, damage, or excessive corrosion, and replace as required.
6. Inspect upper port of radiator (Figure 2, Item 1) for damage and corrosion. Replace radiator (Figure 2, Item 1) if damaged (WP 0027, Remove/Install Radiator).

END OF TASK**Install Upper Radiator Hose Assembly**

1. Wipe down all components with a wiping rag prior to installation.
2. Install coolant hose (Figure 2, Item 13) and two hose clamps (Figure 2, Items 2 and 12) to radiator end of upper water tube (Figure 2, Item 6).
3. Install coolant hose elbow (Figure 2, Item 8) and two hose clamps (Figure 2, Items 7 and 9) to thermostat housing end of upper water tube (Figure 2, Item 6).
4. Apply thread sealing compound to threads of tee on upper water tube (Figure 2, Item 6).
5. Install pressure equalization valve (Figure 2, Item 5) and plug (Figure 2, Item 11) onto tee of upper water tube (Figure 2, Item 6).

REMOVE/INSTALL RADIATOR HOSE AND TUBE ASSEMBLIES – CONTINUED

6. Position upper radiator hose assembly (Figure 1) to its mounting location in generator set and secure by installing coolant hose (Figure 2, Item 13) to upper port of radiator (Figure 2, Item 1), and coolant hose elbow (Figure 2, Item 8) to thermostat housing (Figure 2, Item 10). Secure by installing hose clamps (Figure 2, Items 2, 7, 9, and 12) to their final locations.

CAUTION

Over-tightened hose clamps may cause hoses to crack and leak. Failure to comply may cause damage to equipment.

7. Install hose (Figure 2, Item 3) to equalization valve (Figure 2, Item 5) and secure by tightening hose clamp (Figure 2, Item 4).
8. Fill radiator with engine coolant (WP 0021, Service Cooling System).
9. Install front body panel (WP 0029, Remove/Install Front Body Panel).
10. Install top body panel (WP 0028, Remove/Install Top Body Panel).
11. Install ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
12. Close left- and right-side doors.
13. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
14. Start engine and check for coolant leaks and proper operation (TM 9-6115-749-10).
15. Repair as required.

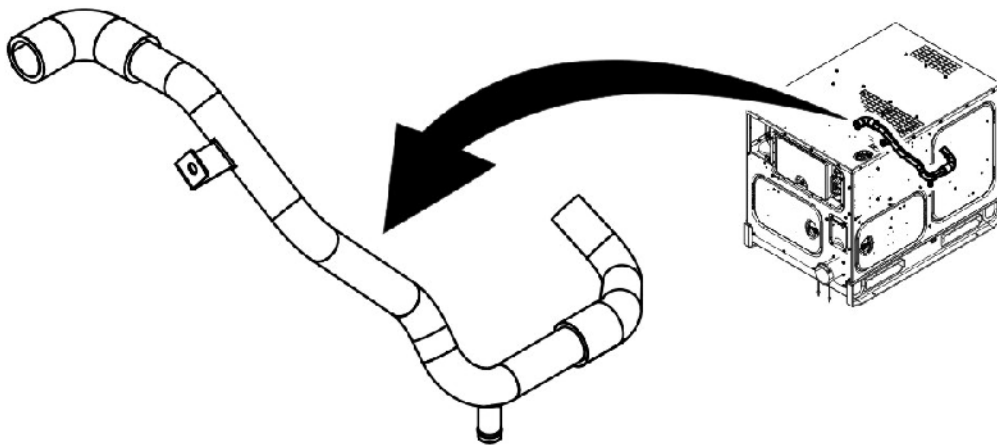
END OF TASK**Remove Lower Radiator Hose Assembly**

Figure 3. Lower Radiator Hose Assembly - Location.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Remove front body panel (WP 0029, Remove/Install Front Body Panel).
3. Open right-side door.
4. Locate lower radiator hose assembly (Figure 3).

REMOVE/INSTALL RADIATOR HOSE AND TUBE ASSEMBLIES – CONTINUED

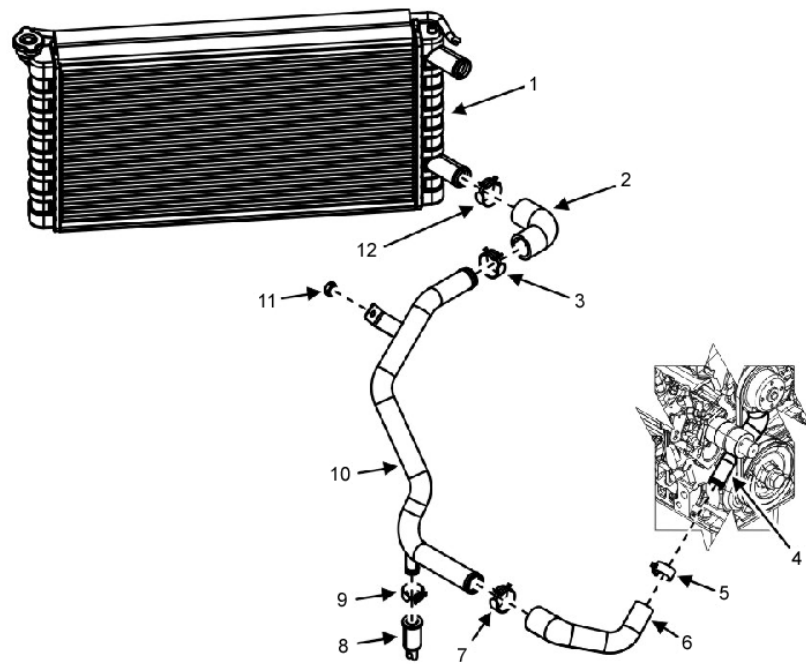


Figure 4. Lower Radiator Hose Assembly.

NOTE

Place a suitable container or rags under each hose connection prior to removal to capture any residual coolant that may be spilled when hoses are removed.

Cap/plug all open coolant hoses, ports, and fittings to prevent additional spillage and to prevent contamination from entering the cooling system.

5. Loosen hose clamp (Figure 4, Item 5) at water pump (Figure 4, Item 4), and remove coolant elbow (Figure 4, Item 6) from water pump (Figure 4, Item 4).
6. Loosen hose clamp (Figure 4, Item 12) at lower port of radiator (Figure 4, Item 1), and remove coolant hose elbow (Figure 4, Item 2) from radiator (Figure 4, Item 1).
7. Loosen hose clamp (Figure 4, Item 9), and remove hose (Figure 4, Item 8) from lower water tube (Figure 4, Item 10).
8. Remove nut (Figure 4, Item 11) that secures lower water tube (Figure 4, Item 10) to unit.
9. Remove lower radiator hose assembly (Figure 3) from generator set, and place on a suitable work surface.
10. Remove two hose clamps (Figure 4, Items 3 and 12) and coolant hose elbow (Figure 4, Item 2) from lower water tube (Figure 4, Item 10).
11. Remove two hose clamps (Figure 4, Items 5 and 7) and coolant elbow (Figure 4, Item 6) from lower water tube (Figure 4, Item 10).

END OF TASK

REMOVE/INSTALL RADIATOR HOSE AND TUBE ASSEMBLIES – CONTINUED**Inspect Lower Radiator Hose Assembly**

1. Inspect hose clamps (Figure 4, Items 3, 5, 7, 9, and 12) for cracks, excessive corrosion, or other signs of obvious damage, and repair or replace as required.
2. Inspect hoses (Figure 4, Items 2 and 6) for firmness, cracks, wear, or other signs of obvious damage, and repair or replace as required.
3. Remove any scale from all hose ends with scale-removing compound and wiping rag prior to installation.
4. Inspect lower water tube (Figure 4, Item 10) for cracks, damage, or excessive corrosion, and replace as required.
5. Inspect lower port of radiator (Figure 4, Item 1) for damage. Replace radiator (Figure 4, Item 1) if damaged (WP 0027, Remove/Install Radiator).

END OF TASK**Install Lower Radiator Hose Assembly**

1. Wipe down all components with a wiping rag prior to installation.
2. Install coolant hose elbow (Figure 4, Item 2) and two hose clamps (Figure 4, Items 3 and 12) to radiator end of lower water tube (Figure 4, Item 10).
3. Install coolant elbow (Figure 4, Item 6) and two hose clamps (Figure 4, Items 5 and 7) to water pump end of lower water tube (Figure 4, Item 10).
4. Position lower radiator hose assembly (Figure 3) to its approximate mounting location in generator set.
5. Position bracket of lower water tube (Figure 4, Item 10) to mounting stud on unit, and secure by installing nut (Figure 4, Item 11) finger-tight.
6. Install coolant hose elbow (Figure 4, Item 2) to lower port of radiator (Figure 4, Item 1) and coolant elbow (Figure 4, Item 6) to water pump (Figure 4, Item 4). Secure by installing hose clamps (Figure 4, Items 3, 12, 5, and 7) to their final locations.
7. Install hose (Figure 4, Item 8) to lower water tube (Figure 4, Item 10), and secure by repositioning hose clamp (Figure 4, Item 9).
8. Tighten nut (Figure 4, Item 11).
9. Fill radiator with engine coolant (WP 0021, Service Cooling System).
10. Install front body panel (WP 0029, Remove/Install Front Body Panel).
11. Install top body panel (WP 0028, Remove/Install Top Body Panel).
12. Install ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
13. Close right-side door.
14. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
15. Start engine and check for coolant leaks and proper operation (TM 9-6115-749-10). Apply 100% rated load to generator set for 30 minutes or until coolant reaches normal operating temperature (TM 9-6115-749-10).
16. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

REMOVE/INSTALL WINTERIZATION KIT COMPONENTS

INITIAL SETUP:**Test Equipment**

Beaker, Laboratory (WP 0162, Table 2, Item 3)

Personnel Required

91D (1)

Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Wrench, Torque, Dial, 1/4 in Drive, 30 in•lb (WP 0162, Table 2, Item 42)

Wrench, Torque, Dial, 3/8 in Drive, 300 in•lb (WP 0162, Table 2, Item 43)

References

WP 0021, Service Cooling System

WP 0036, Remove/Install Batteries

WP 0039, Service Fuel System

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)

Engine cool

Materials/Parts

Heater (1) (WP 0155, Item 3)

Antifreeze, ethylene glycol (WP 0163, Table 1, Item 2)

Cap set, protective (WP 0163, Table 1, Item 8)

Fuel, diesel (WP 0163, Table 1, Item 19)

Pan, drain (WP 0163, Table 1, Item 28)

Rag, wiping (WP 0163, Table 1, Item 31)

REMOVE/INSTALL WINTERIZATION KIT COMPONENTS**WARNING**

Engine coolant is toxic to eyes and poisonous if ingested. Eye protection is required when working with engine coolant. Avoid repeated or prolonged contact. Failure to comply may cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Do not ground yourself in standing water. Failure to comply may cause injury or death to personnel and damage to equipment.

WARNING

Fuels used in the generator set are combustible. Do not smoke or use open fire when performing maintenance. Fire and possible explosion may result. Failure to comply may cause injury or death to personnel and damage to equipment.

WARNING

Hearing protection is required during maintenance or repair with engine running. Failure to comply can cause hearing loss.

REMOVE/INSTALL WINTERIZATION KIT COMPONENTS – CONTINUED**WARNING**

Cooling system operates at high temperature and pressure. Contact with high-pressure steam and/or liquids can cause burns and scalding. Shut down generator set and allow system to cool before performing checks, services, and maintenance. Wear gloves, additional protective clothing, and goggles as required. Failure to comply may cause injury or death to personnel.

WARNING

When operating, winterization kit has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow heater to cool before performing maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.

NOTE

Winterization kit is optional for AMMPS generator sets. This WP instructs how to test, remove, and install winterization kit components to an AMMPS generator set that is already equipped with a winterization kit.

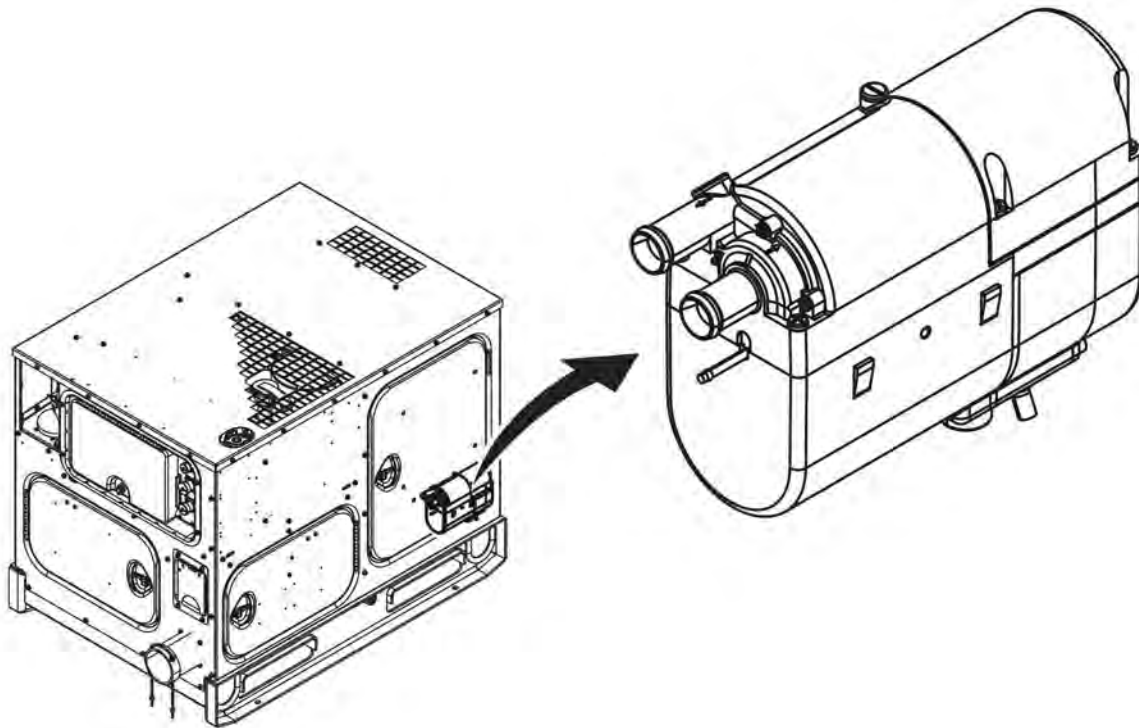
Test Winterization Kit Fuel Flow

Figure 1. Heater - Location.

1. Ensure equipment conditions are met in order presented initial setup.
2. Locate heater (Figure 1) attached to generator set frame.
3. Place drip pan under winterization kit assembly (Figure 2) to catch spills.

REMOVE/INSTALL WINTERIZATION KIT COMPONENTS – CONTINUED

4. Loosen clamp (Figure 2, Item 3), and remove fuel line (Figure 2, Item 4) from fuel inlet port (Figure 2, Item 2) on heater (Figure 2, Item 1).

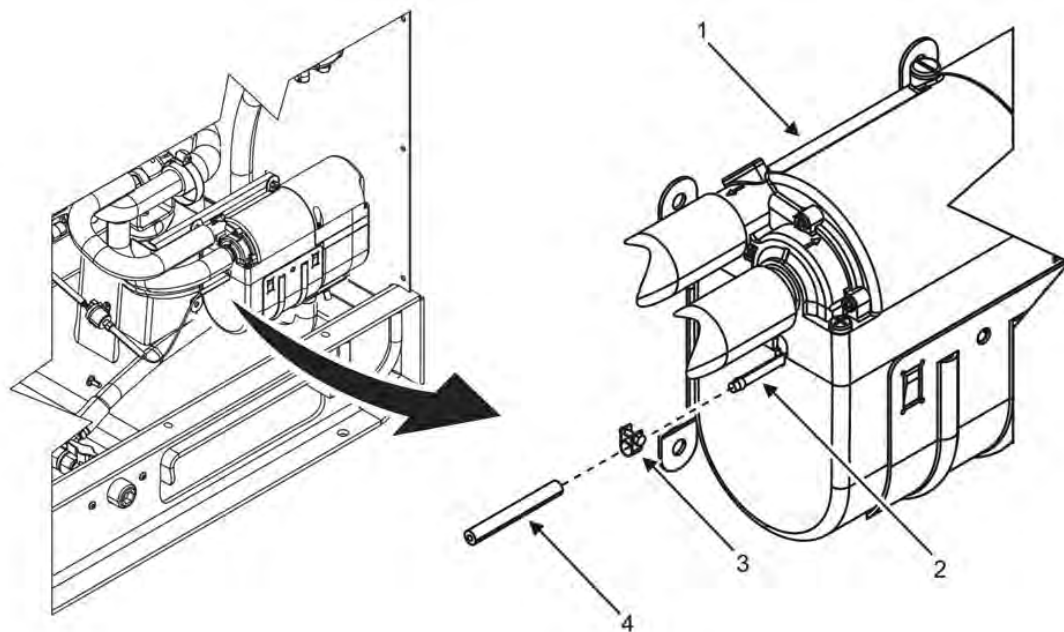


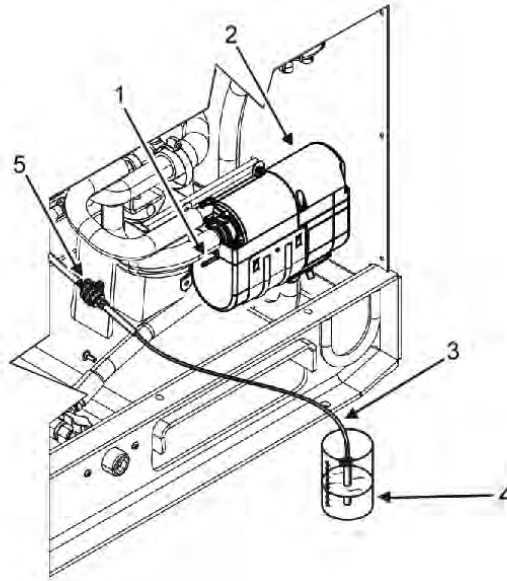
Figure 2. Heater Fuel Line.

NOTE

Capture and dispose of spilled fuel and coolant IAW local SOP.

5. Place open fuel line (Figure 3, Item 3) into laboratory beaker (Figure 3, Item 4).
6. Run winterization test through DCS (TM 9-6115-749-10).
 - a. Move engine control switch to PRIME & RUN (TM 9-6115-749-10).
 - b. Listen for fuel injector pump to complete priming cycle before proceeding.
 - c. Press [ADJUSTMENTS] button (TM 9-6115-749-10).
 - d. Press [NEXT] button (TM 9-6115-749-10) until winterization kit test is highlighted.
 - e. Press [SELECT] button (TM 9-6115-749-10) to highlight [Start Test].
 - f. Press [ACCEPT] button (TM 9-6115-749-10).
7. Allow fuel to flow into laboratory beaker (Figure 3, Item 4) until flow is uniform (approximately 40 sec).
8. Stop winterization test.
 - a. Observe winterization test is highlighted.
 - b. Press [SELECT] button (TM 9-6115-749-10) to highlight [Stop Test].
 - c. Press [ACCEPT] button (TM 9-6115-749-10).

REMOVE/INSTALL WINTERIZATION KIT COMPONENTS – CONTINUED

**Figure 3. Test Winterization Kit Fuel Flow.****NOTE**

Capture and dispose of spilled fuel and coolant IAW local SOP.

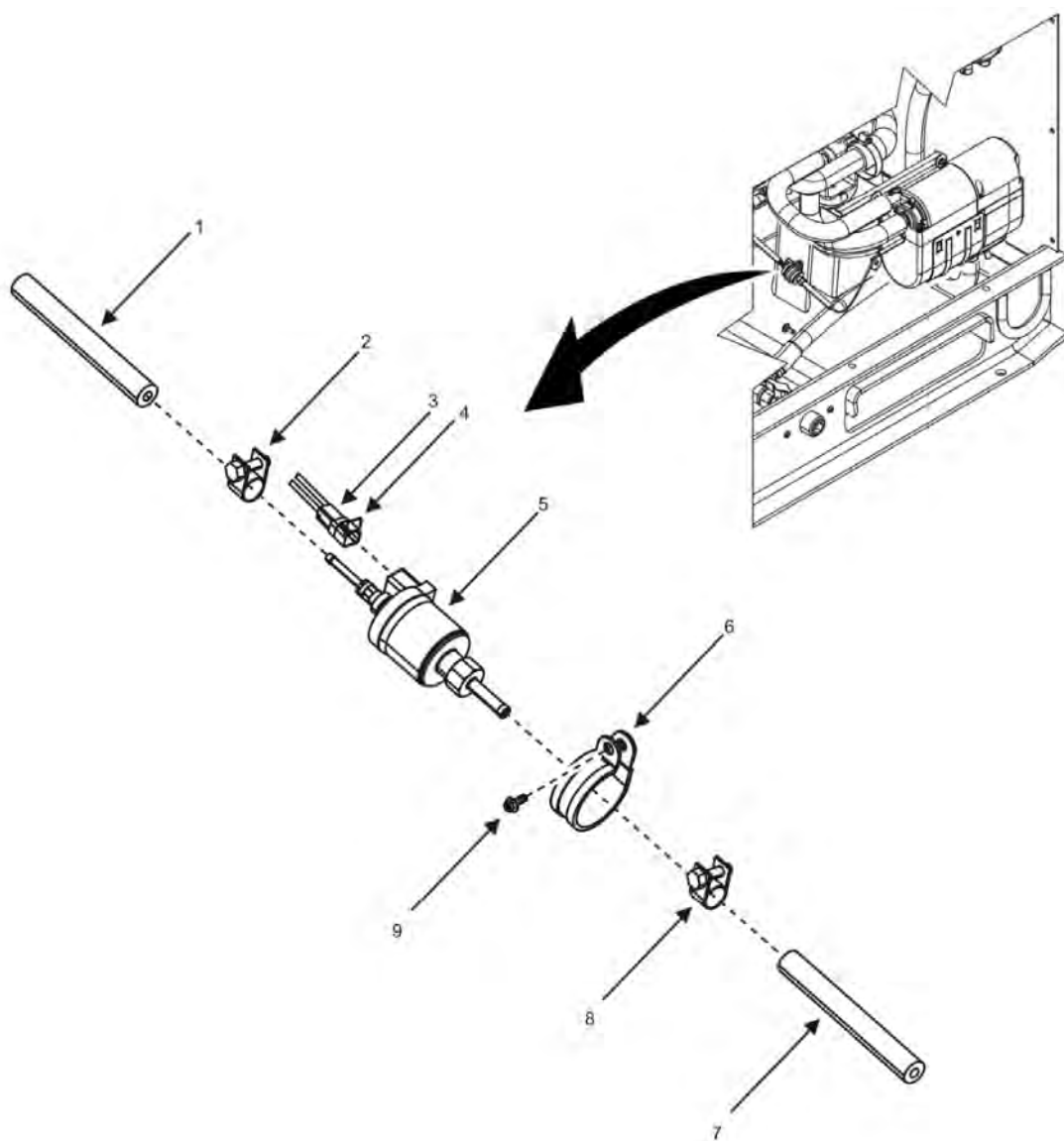
9. Empty captured fuel from laboratory beaker (Figure 3, Item 4) into a suitable container for disposal.
10. Place open fuel line (Figure 3, Item 3) back into laboratory beaker (Figure 3, Item 4).
11. Repeat Step 6 to run winterization test through DCS (TM 9-6115-749-10).
12. Allow fuel to flow into laboratory beaker (Figure 3, Item 4) for 90 sec.
13. Repeat Step 8 to stop winterization test.
14. Check volume of fuel captured in laboratory beaker during 90-sec test.
 - a. If measured fuel flow is less than 7.5 cubic centimeters (cm^3) (0.25 fluid ounces (oz)), follow the directions in this WP to inspect the winterization kit. See Inspect Winterization Kit task. If no clogs or leaks are found, follow instructions in this WP to replace winterization kit fuel pump (Figure 3, Item 5). See Remove Winterization Kit Fuel Pump and Install Winterization Kit Fuel Pump tasks below.
 - b. If measured fuel flow is greater than 8.6 cm^3 (0.29 fluid oz), follow instructions in this WP to replace winterization kit fuel pump (Figure 3, Item 5). See Remove Winterization Kit Fuel Pump and Install Winterization Kit Fuel Pump tasks below.

NOTE

Wipe down hoses, parts, and connectors with wiping rag prior to installation.

15. Reconnect fuel line (Figure 3, Item 3) to fuel intake port (Figure 3, Item 1) on heater (Figure 3, Item 2) using clamp (Figure 2, Item 3) if winterization kit fuel pump (Figure 3, Item 5) is working properly.
16. Ensure fuel level is at proper operating level (TM 9-6115-749-10).
17. See Inspect Winterization Kit task if coolant is not being heated.

END OF TASK

REMOVE/INSTALL WINTERIZATION KIT COMPONENTS – CONTINUED**Remove Winterization Kit Fuel Pump****Figure 4. Winterization Kit Fuel Pump.**

1. Open left-side generator set door.
2. Remove negative ground cable from right-hand battery (WP 0036, Remove/Install Batteries).
3. Locate winterization kit fuel pump (Figure 4, Item 5) attached to generator set frame.
4. Remove metal clip (Figure 4, Item 4), and disconnect wiring harness (Figure 4, Item 3) from winterization kit fuel pump (Figure 4, Item 5).
5. Loosen screw (Figure 4, Item 9) securing rubber mounting bracket (Figure 4, Item 6) and winterization kit fuel pump (Figure 4, Item 5) to generator set frame.
6. Remove winterization kit fuel pump (Figure 4, Item 5) from rubber mounting bracket (Figure 4, Item 6).
7. Position winterization kit fuel pump (Figure 4, Item 5) outside of bulkhead.

REMOVE/INSTALL WINTERIZATION KIT COMPONENTS – CONTINUED**NOTE**

Capture and dispose of spilled fuel and coolant IAW local SOP.

8. Place wiping rags under winterization kit fuel pump (Figure 4, Item 5) to catch spills.
9. Loosen clamps (Figure 4, Items 2 and 8), and disconnect fuel lines (Figure 4, Items 1 and 7) from heater (Figure 5, Item 1).
10. Insert caps/plugs into fuel lines (Figure 4, Items 1 and 7).
11. Dispose of captured fuel and coolant IAW local SOP.

END OF TASK**Install Winterization Kit Fuel Pump****NOTE**

Wipe down hoses, parts, and connectors with wiping rag prior to installation.

1. Inspect rubber mounting bracket (Figure 4, Item 6) securing winterization kit fuel pump (Figure 4, Item 5) to generator set frame. Replace rubber mounting bracket (Figure 4, Item 6) if worn or damaged.
2. Slide winterization kit fuel pump (Figure 4, Item 5) into rubber mounting bracket (Figure 4, Item 6).

NOTE

Capture and dispose of spilled fuel and coolant IAW local SOP.

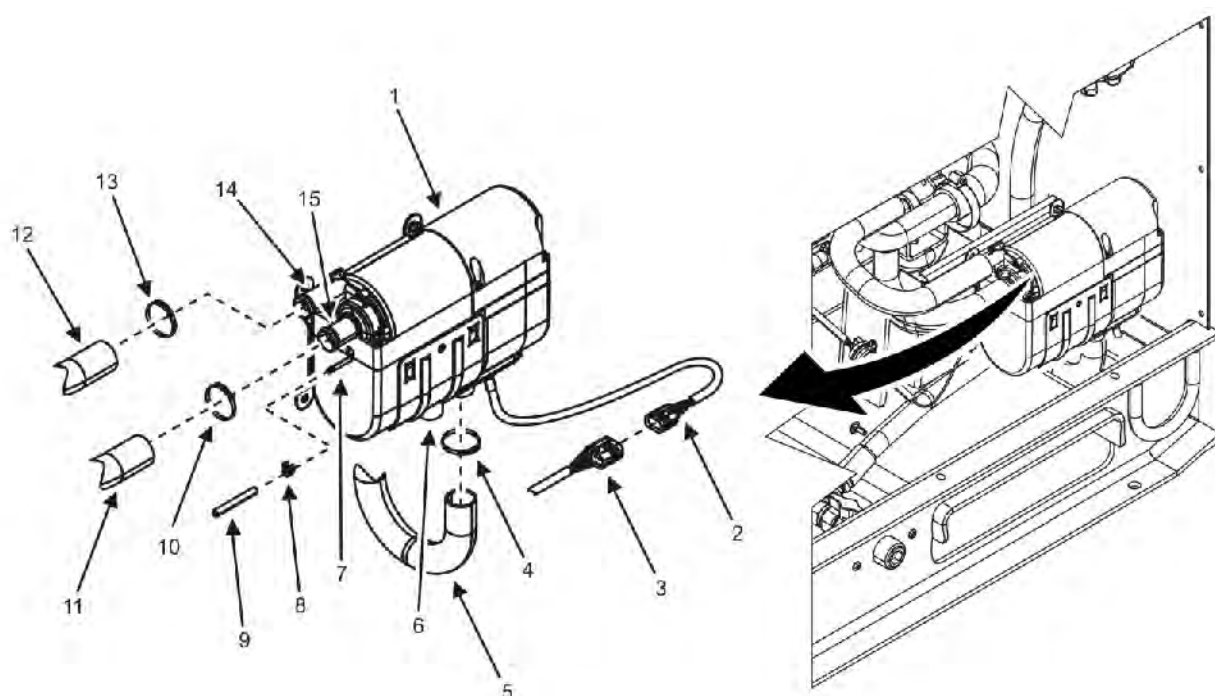
3. Remove caps/plugs from fuel lines (Figure 4, Items 1 and 7).
4. Connect fuel lines (Figure 4, Items 1 and 7) to winterization kit fuel pump (Figure 4, Item 5) using clamps (Figure 4, Items 2 and 8).
5. Use screw (Figure 4, Item 9) to secure rubber mounting bracket (Figure 4, Item 6) and winterization kit fuel pump (Figure 4, Item 5) to generator set frame. Torque screw to 25-30 in•lb (2.8-3.5 N•m).
6. Remove drip pan from under winterization kit fuel pump (Figure 4, Item 5).
7. Connect wiring harness (Figure 4, Item 3) to winterization kit fuel pump (Figure 4, Item 5) using metal clip (Figure 4, Item 4).
8. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
9. Close and secure generator set doors.
10. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
11. Ensure fluid level is at proper operating level (TM 9-6115-749-10).
12. Purge fuel system (WP 0039, Service Fuel System).
13. Start engine, and check for proper operation (TM 9-6115-749-10).
14. Inspect winterization kit if coolant is not being heated. See Inspect Winterization Kit task, Steps 1 through 7.

END OF TASK**Inspect Winterization Kit**

1. Inspect heater (Figure 5, Item 1) for obvious signs of damage, and replace as required.
2. Inspect heater holder (Figure 6, Item 7) for obvious signs of damage, and replace as required.
3. Inspect mounting bracket (Figure 6, Item 10) for obvious signs of damage, and replace as required.

REMOVE/INSTALL WINTERIZATION KIT COMPONENTS – CONTINUED

4. Inspect coolant inlet and outlet hoses (Figure 5, Items 11 and 12) for damage, deterioration, and obstruction, and replace as required.
5. Inspect air exhaust port (Figure 5, Item 6) for obstructions, and clear as required.
6. Inspect air exhaust tube (Figure 5, Item 5) for damage, deterioration, and obstructions, and clear as required.
7. Follow instructions in this WP to remove heater (Figure 5, Item 1) if coolant is still not being heated. See Remove Heater Assembly task.

END OF TASK**Remove Heater Assembly****Figure 5. Winterization Kit.**

1. Open left-side generator set door.
2. Remove negative ground cable from right-hand battery (WP 0036, Remove/Install Batteries).
3. Drain coolant (WP 0021, Service Cooling System).
4. Disconnect winterization kit electrical plug (Figure 5, Item 2) from wiring harness (Figure 5, Item 3).
5. Remove winterization kit electrical plug (Figure 5, Item 2) from clamp (Figure 6, Item 3).

CAUTION

Cap/plug all coolant and fuel hoses to prevent contamination. Failure to comply may cause damage to equipment.

6. Remove bolt (Figure 6, Item 6) securing heater (Figure 6, Item 5) to heater holder (Figure 6, Item 7).
7. Loosen bolt (Figure 6, Item 4) behind heater (Figure 6, Item 5) that secures heater (Figure 6, Item 5) to heater holder (Figure 6, Item 7). Leave bolt (Figure 6, Item 4) installed as required.

REMOVE/INSTALL WINTERIZATION KIT COMPONENTS – CONTINUED

8. Remove heater (Figure 6, Item 5) from heater holder (Figure 6, Item 7) by prying seating slots on heater holder (Figure 6, Item 7) from catches on heater (Figure 6, Item 5).
9. Position heater (Figure 6, Item 5) outside of unit.
10. Remove four screws (Figure 6, Item 8) securing heater holder (Figure 6, Item 7) and clamp (Figure 6, Item 3) to heater mounting bracket (Figure 6, Item 10).
11. Remove two screws (Figure 6, Item 9) from front of heater mounting bracket (Figure 6, Item 10) that secure heater mounting bracket (Figure 6, Item 10) to support bracket (Figure 6, Item 2).
12. Remove two screws (Figure 6, Item 1) that secure support bracket (Figure 6, Item 2) to unit skid.
13. Remove support bracket (Figure 6, Item 2) from unit skid.

NOTE

Bottom screw also secures winterization kit fuel pump (Figure 4, Item 5).

14. Remove two screws (Figure 6, Item 11) that secure heater mounting bracket (Figure 6, Item 10) to left-side of unit skid.
15. Remove heater mounting bracket (Figure 6, Item 10) from unit skid.
16. Loosen tube clamp (Figure 5, Item 4) securing air exhaust tube (Figure 5, Item 5) to heater (Figure 5, Item 1).
17. Remove air exhaust tube (Figure 5, Item 5) from exhaust port (Figure 5, Item 6).

NOTE

Capture and dispose of spilled fuel and coolant IAW local SOP.

18. Place a drain pan under winterization kit (Figure 5) to catch spilled fuel and coolant.
19. Loosen clamp (Figure 5, Item 13), and disconnect coolant inlet hose (Figure 5, Item 12) from coolant inlet port (Figure 5, Item 14).
20. Loosen clamp (Figure 5, Item 10), and disconnect coolant outlet hose (Figure 5, Item 11) from coolant outlet port (Figure 5, Item 15).

CAUTION

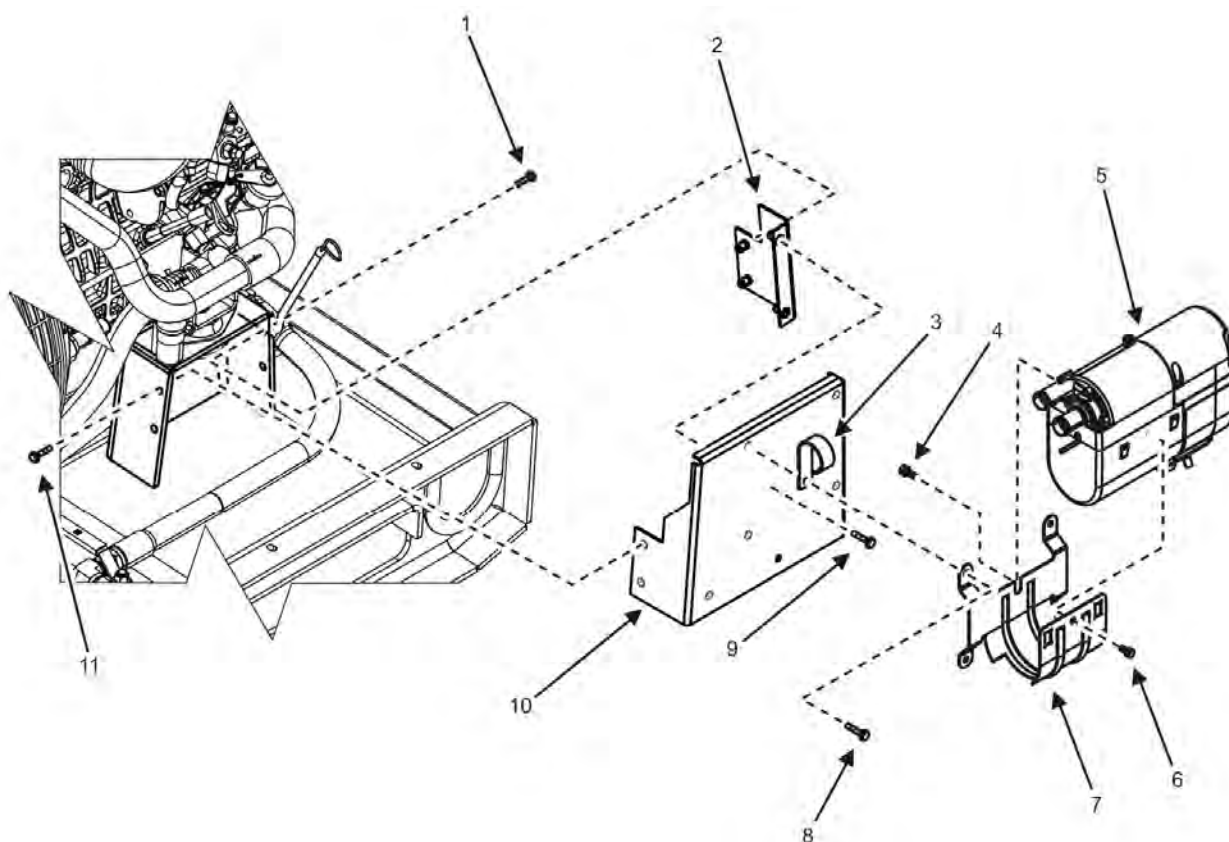
Cap/plug all coolant and fuel hoses to prevent contamination. Failure to comply may cause damage to equipment.

NOTE

Capture and dispose of spilled fuel and coolant IAW local SOP.

21. Loosen clamp (Figure 5, Item 8), and remove fuel line (Figure 5, Item 9) from fuel inlet port (Figure 5, Item 7).
22. Remove drain pan, and dispose of spilled fluids IAW local SOP.

END OF TASK

REMOVE/INSTALL WINTERIZATION KIT COMPONENTS – CONTINUED**Install Heater Assembly****Figure 6. Heater Mounting Brackets.****NOTE**

Wipe down hoses, parts, and connectors with wiping rag prior to installation.

1. Position support bracket (Figure 6, Item 2) to right-side of installation location on unit skid, and align mounting holes.
2. Install two screws (Figure 6, Item 1) to secure support bracket (Figure 6, Item 2) to unit skid. Torque screws (Figure 6, Item 1) to 87-105 in•lb (10-11 N•m).
3. Position heater mounting bracket (Figure 6, Item 10) to left-side of unit skid and support bracket (Figure 6, Item 2). Align mounting holes.
4. Install two screws (Figure 6, Item 9) to front of heater mounting bracket (Figure 6, Item 10) to secure heater mounting bracket (Figure 6, Item 10) to support bracket (Figure 6, Item 2). Torque screws (Figure 6, Item 9) to 87-105 in•lb (10-11 N•m).
5. Install two screws (Figure 6, Item 11) to secure heater mounting bracket (Figure 6, Item 10) to left-side unit skid. Torque screws (Figure 6, Item 11) to 87-105 in•lb (10-11 N•m).
6. Align mounting holes in heater holder (Figure 6, Item 7) with holes in heater mounting bracket (Figure 6, Item 10).
7. Install four screws (Figure 6, Item 8) to secure heater holder (Figure 6, Item 7) and clamp (Figure 6, Item 3) to heater mounting bracket (Figure 6, Item 10).

REMOVE/INSTALL WINTERIZATION KIT COMPONENTS – CONTINUED

8. Use tube clamp (Figure 5, Item 4) to secure air exhaust tube (Figure 5, Item 5) to heater (Figure 5, Item 1) exhaust port (Figure 5, Item 6).
9. Install heater (Figure 6, Item 5) into heater holder (Figure 6, Item 7).
10. Seat both catches on heater (Figure 6, Item 5) into seating slots on heater holder (Figure 6, Item 7).
11. Install bolt (Figure 6, Item 6) to secure heater (Figure 6, Item 5) to heater holder (Figure 6, Item 7).
12. Tighten bolt (Figure 6, Item 4) behind heater (Figure 6, Item 5) to secure heater (Figure 6, Item 5) to heater holder (Figure 6, Item 7).

CAUTION

Cap/plug all coolant and fuel hoses to prevent contamination. Failure to comply may cause damage to equipment.

NOTE

Capture and dispose of spilled fuel and coolant IAW local SOP.

13. Place a drain pan under winterization kit to catch spilled coolant.
14. Secure fuel line (Figure 5, Item 9) to fuel inlet port (Figure 5, Item 7) using clamp (Figure 5, Item 8).
15. Install coolant inlet hose (Figure 5, Item 12) onto coolant inlet port (Figure 5, Item 14) using clamp (Figure 5, Item 13).
16. Install coolant outlet hose (Figure 5, Item 11) to coolant outlet port (Figure 5, Item 15) using clamp (Figure 5, Item 10).
17. Remove drain pan.
18. Insert winterization kit electrical plug (Figure 5, Item 2) into clamp (Figure 6, Item 3).
19. Reconnect winterization kit electrical plug (Figure 5, Item 2) into wiring harness (Figure 5, Item 3).
20. Replace negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
21. Fill cooling system (WP 0021, Service Cooling System).
22. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
23. Ensure fluid level is at proper operating level (TM 9-6115-749-10).
24. Purge fuel system (WP 0039, Service Fuel System).
25. Release air through overflow vent line for 5 min before start-up (TM 9-6115-749-10).
26. Close and secure generator set doors.
27. Start engine and check for leaks and proper operation (TM 9-6115-749-10).
28. Repair as required.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE

INSTALL WINTERIZATION KIT

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, Blind, Fastener, Installation (WP 0162, Table 2, Item 32)
 Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
 Wrench, Torque, Dial, 3/8 in Drive, 300 in•lb (WP 0162, Table 2, Item 43)

Personnel Required

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References

WP 0025, Remove/Install Winterization Kit Components
 WP 0039, Service Fuel System

Materials/Parts

Winterization Kit, Generator Set (WP 0155, Item 1)
 Alcohol, denatured (WP 0163, Table 1, Item 1)
 Antifreeze, ethylene glycol (WP 0163, Table 1, Item 2)
 Cap set, protective (WP 0163, Table 1, Item 8)
 Grease, electrically conductive (WP 0163, Table 1, Item 20)
 Rag, wiping (WP 0163, Table 1, Item 31)
 Sealant (WP 0163, Table 1, Item 32)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool
 Battery ground cable removed (WP 0036, Remove/Install Batteries)
 Top body panel removed (WP 0028, Remove/Install Top Body Panel)
 Coolant drained (WP 0021, Service Cooling System)

INSTALL WINTERIZATION KIT**WARNING**

Fuel is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash skin and change clothing promptly if in contact with fuel. Failure to comply may cause injury or death to personnel.

WARNING

Fuels used in the generator set are combustible. Do not smoke or use open fire when performing maintenance. Fire and possible explosion may result. Failure to comply may cause injury or death to personnel and damage to equipment.

WARNING

Engine coolant is toxic to eyes and poisonous if ingested. Eye protection is required when working with engine coolant. Avoid repeated or prolonged contact. Failure to comply may cause injury or death to personnel.

WARNING

Hearing protection is required during maintenance or repair with engine running. Failure to comply can cause hearing loss.

INSTALL WINTERIZATION KIT – CONTINUED**WARNING**

When operating, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow engine to cool before checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.

WARNING

Exhaust discharge contains deadly gases, including carbon monoxide. Exhaust gases are most dangerous in places with poor ventilation. Do not operate generator set in an enclosed area unless exhaust discharge is properly vented. Failure to comply may cause injury or death to personnel.

WARNING

High voltage is produced when generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Do not ground yourself in standing water. Never attempt to connect or disconnect load cables while the generator sets are running. Failure to comply may cause injury or death to personnel.

NOTE

Winterization kit is optional for AMMPS generator sets. This WP instructs how to install a winterization kit to an AMMPS generator set that is not equipped with a winterization kit.

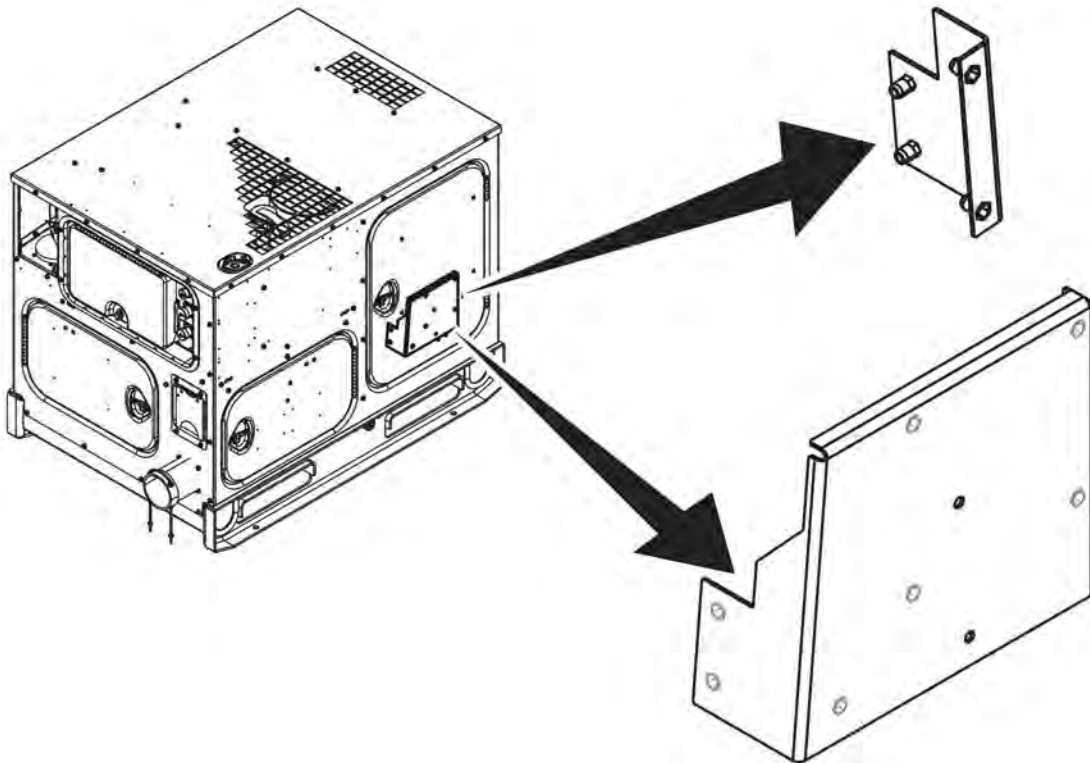
Install Winterization Kit

Figure 1. Winterization Kit Mounting - Location.

1. Ensure equipment conditions are met in order presented in initial setup.

INSTALL WINTERIZATION KIT – CONTINUED

2. Open right-side door.
3. Locate winterization kit mounting location on unit skid (Figure 1).

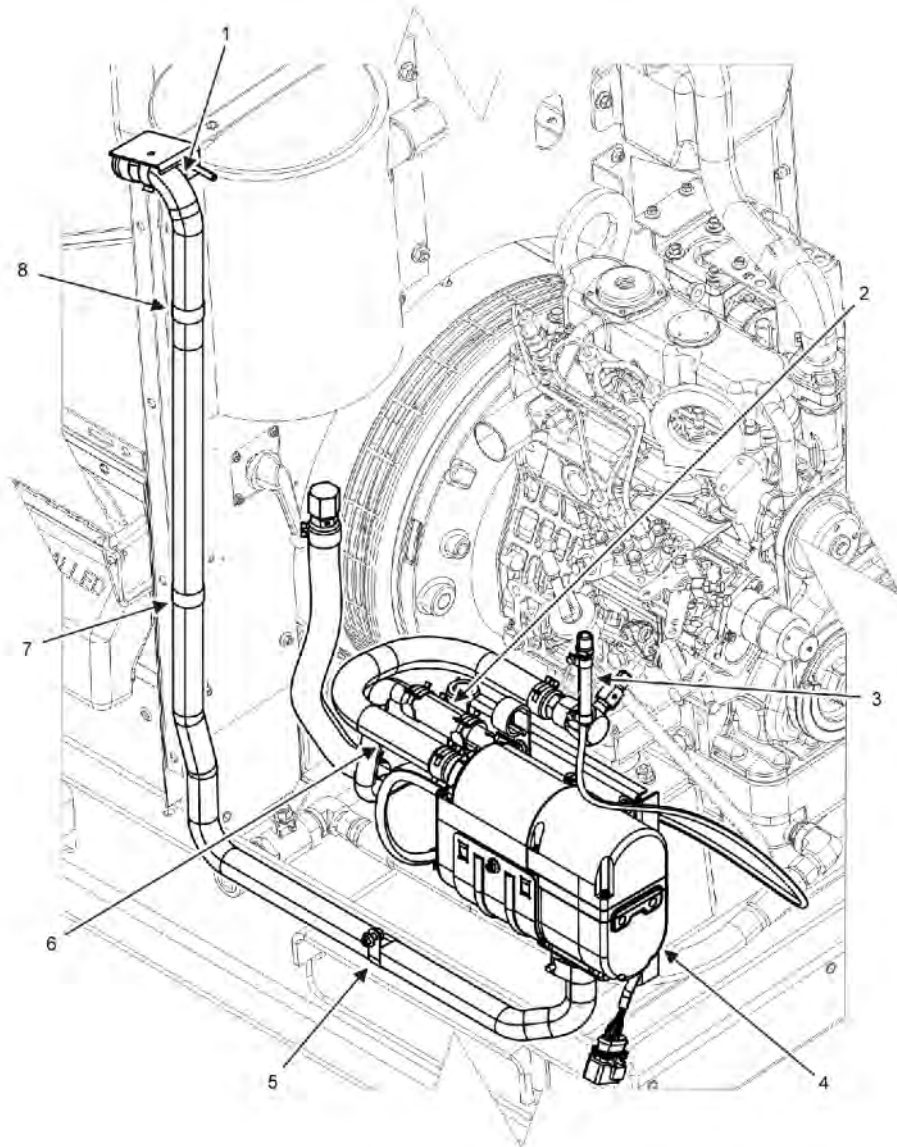


Figure 2. Winterization Kit Assembly.

NOTE

Winterization kit assembly (Figure 2) requires two fuel line (Figure 2, Item 3) assemblies. One fuel line (Figure 2, Item 3) assembly connects from the fuel manifold (Figure 3, Item 2) to the winterization kit fuel pump (not shown). The second fuel line connects the winterization kit fuel pump to the coolant heater (Figure 2, Item 4). Fuel line assembly that connects fuel pump (not shown) to coolant heater (Figure 2, Item 4) is installed in Step 15 of this task.

4. Prepare coolant heater fuel lines (Figure 2, Item 3).

INSTALL WINTERIZATION KIT – CONTINUED

- a. Insert one end of fuel tube (Figure 3, Item 3) into flexible hose (Figure 3, Item 5).

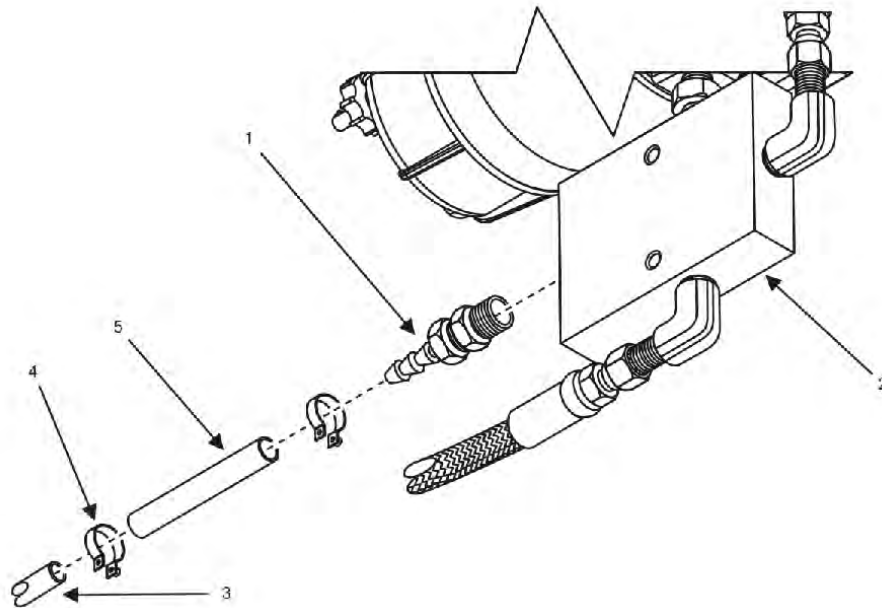


Figure 3. Coolant Heater Fuel Line Assembly.

- b. Secure with hose clamp (Figure 3, Item 4).
- c. Repeat Steps a and b for other end of fuel tube (Figure 3, Item 3).
- d. Repeat Steps a through c to assemble a second coolant heater fuel line assembly.
- e. Insert hose adaptor (Figure 3, Item 1) into flexible hose (Figure 3, Item 5) of fuel line (Figure 2, Item 3) assembly, and secure with hose clamp (Figure 3, Item 4).

NOTE

Use pipe thread sealant on all pipe threads of hose adaptors (Figure 3, Item 1).
Cure time is 30 min to use full system and 72 h for full strength.

- f. Apply pipe thread sealant to male threads of hose adaptor (Figure 3, Item 1).

NOTE

Capture spilled fuel and dispose of with IAW local SOP. Cap/plug all open fuel lines/fittings to prevent dirt and debris from entering the fuel system.

- g. Remove plug (not shown) from fuel manifold (Figure 3, Item 2).
- h. Capture spilled fuel.
- i. Install hose adaptor (Figure 3, Item 1) to fuel manifold (Figure 3, Item 2) and secure to 1 to 1 1/2 turns past finger-tight.
- j. Reserve second fuel line assembly for installation in Step 15.

INSTALL WINTERIZATION KIT – CONTINUED

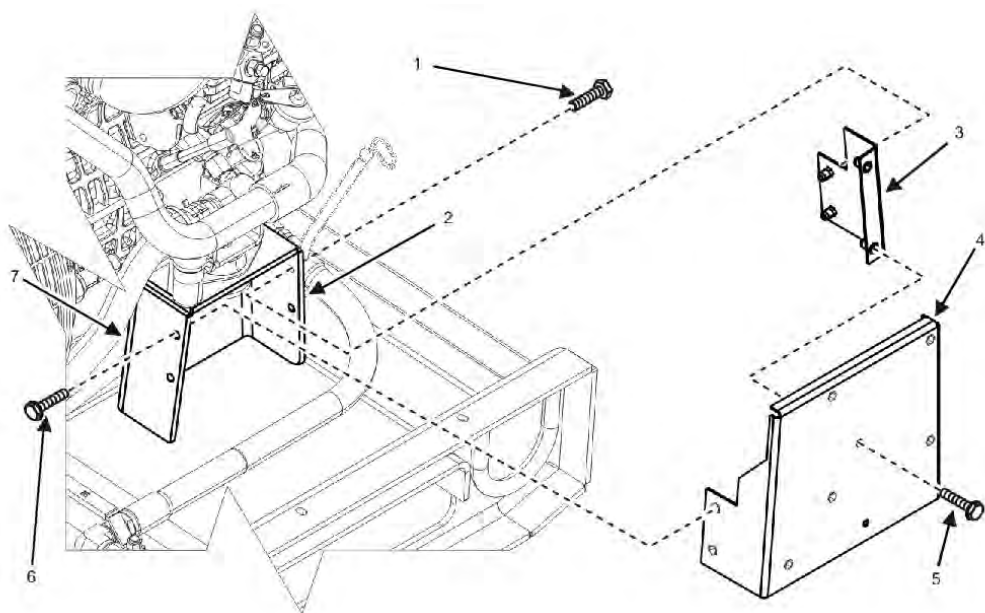


Figure 4. Winterization Kit Bracket - Installation.

5. Position support bracket (Figure 4, Item 3) to right-side of installation location (Figure 4, Item 2) on unit skid, and align mounting holes.
6. Install two screws (Figure 4, Item 1) to secure support bracket (Figure 4, Item 3) to unit skid. Torque screws (Figure 4, Item 1) to 87-105 in•lb (10-11 N•m).
7. Position coolant heater mounting bracket (Figure 4, Item 4) to left-side of installation location (Figure 4, Item 7) on unit skid and support bracket (Figure 4, Item 3). Align mounting holes.
8. Install two screws (Figure 4, Item 5) to front of coolant heater mounting bracket (Figure 4, Item 4) to secure coolant heater mounting bracket (Figure 4, Item 4) to support bracket (Figure 4, Item 3). Torque screws (Figure 4, Item 5) to 87-105 in•lb (10-11 N•m).
9. Install top screw (Figure 4, Item 6) to secure coolant heater mounting bracket (Figure 4, Item 4) to left-side of installation location (Figure 4, Item 7) on unit skid. Reserve bottom screw (Figure 4, Item 6) to secure fuel pump rubber mounting bracket (not shown). Torque screw (Figure 4, Item 6) to 87-105 in•lb (10-11 N•m).

INSTALL WINTERIZATION KIT – CONTINUED

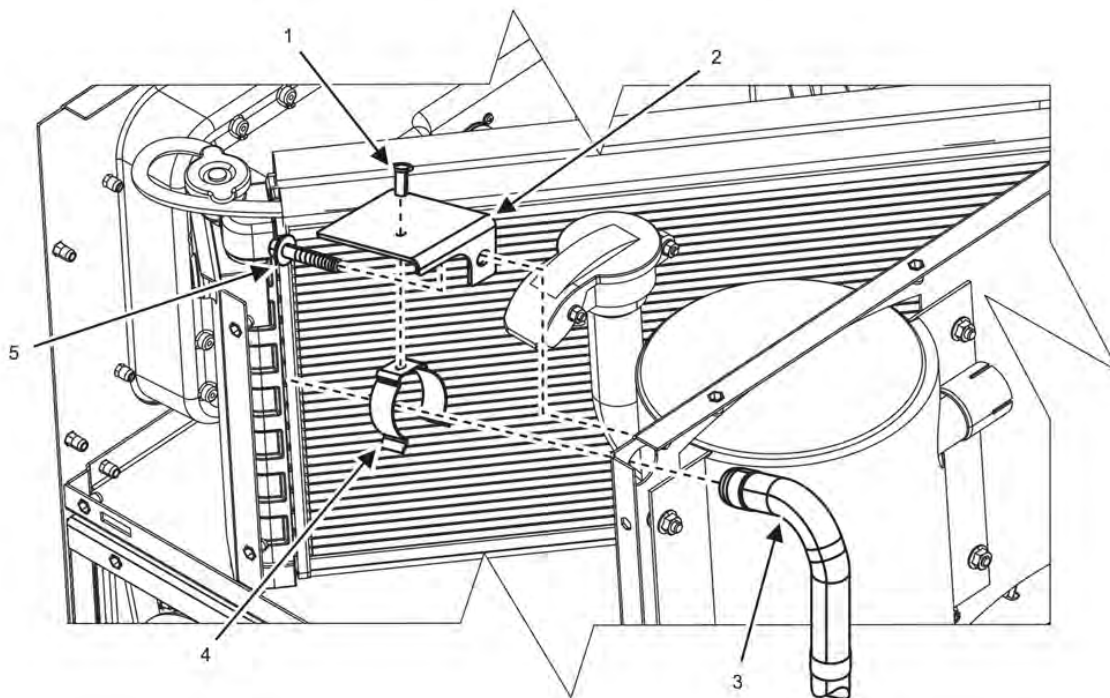


Figure 5. Air Exhaust Tube Bracket Installation.

10. Install fuel pump to coolant heater mounting bracket and connect coolant heater fuel lines (WP 0025, Remove/Install Winterization Kit Components).
11. Prepare air exhaust tube (Figure 2, Item 1).
 - a. Rivet clip (Figure 5, Item 4) to air exhaust tube bracket (Figure 5, Item 2) with blind rivet (Figure 5, Item 1).
 - b. Position air exhaust tube bracket (Figure 5, Item 2) to position on unit bulkhead.
 - c. Secure air exhaust tube bracket (Figure 5, Item 2) to unit bulkhead with mounting screw (Figure 5, Item 5).
 - d. Position air exhaust tube (Figure 2, Item 1) as depicted in Figure 2.
 - e. Insert end of air exhaust tube (Figure 5, Item 3) into clip (Figure 5, Item 4) of air exhaust tube bracket (Figure 5, Item 2).

INSTALL WINTERIZATION KIT – CONTINUED

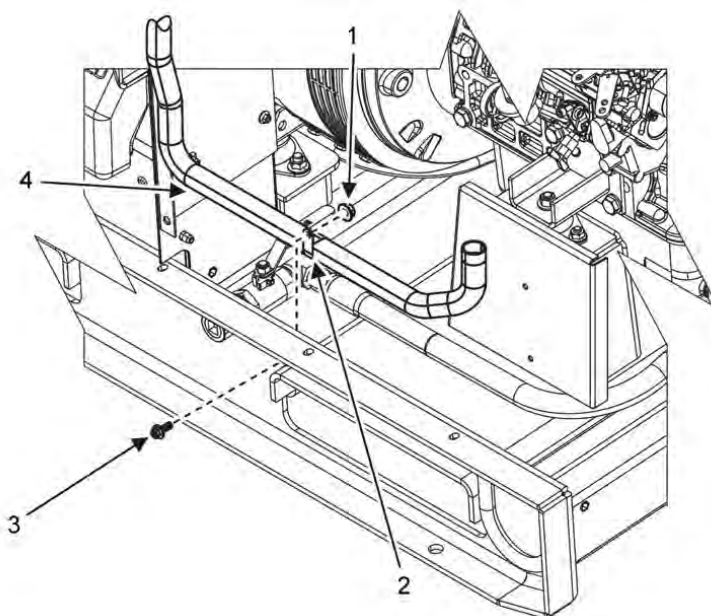


Figure 6. Air Exhaust Tube - Installation.

NOTE

Air exhaust tube (Figure 2, Item 1) will be installed to coolant heater (Figure 2, Item 4) during Step 15.

- f. Insert air exhaust tube (Figure 6, Item 4) through three clamps (Figure 6, Item 2).
- g. Position clamps (Figure 2, Items 5, 7, and 8) to unit skid and bulkhead as depicted in Figure 2.

NOTE

Do not fully tighten screws (Figure 6, Item 3) and nuts (Figure 6, Item 1) securing clamps (Figure 2, Items 5, 7, and 8) to unit skid and bulkhead until installation of coolant heater (Figure 2, Item 4) is complete.

- h. Install clamps loosely to unit skid and bulkhead with screws (Figure 6, Item 3) and nuts (Figure 6, Item 1).

INSTALL WINTERIZATION KIT – CONTINUED

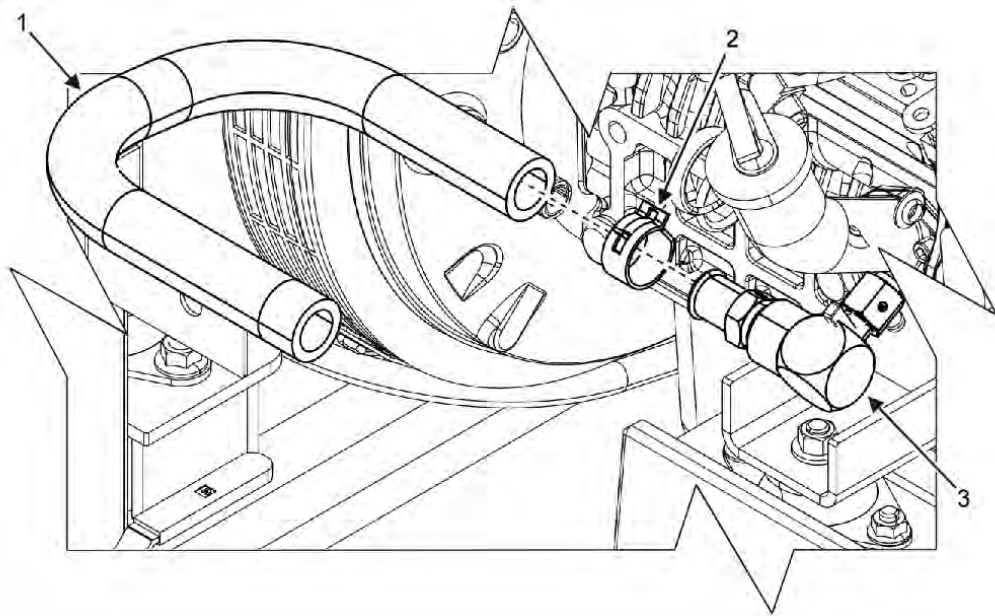


Figure 7. Coolant Heater Inlet Hose Assembly.

12. Prepare coolant heater inlet hose assembly (Figure 2, Item 6).

NOTE

Capture spilled coolant and dispose of with IAW local SOP. Cap/plug all open coolant lines/fittings to prevent dirt and debris from entering the cooling system.

- a. Remove coolant drain hose (not shown) from engine adaptor barbed fitting (Figure 7, Item 3).
- b. Install one end of coolant heater inlet hose (Figure 7, Item 1) to engine adaptor barbed fitting (Figure 7, Item 3), and secure with clip (Figure 7, Item 2).

INSTALL WINTERIZATION KIT – CONTINUED

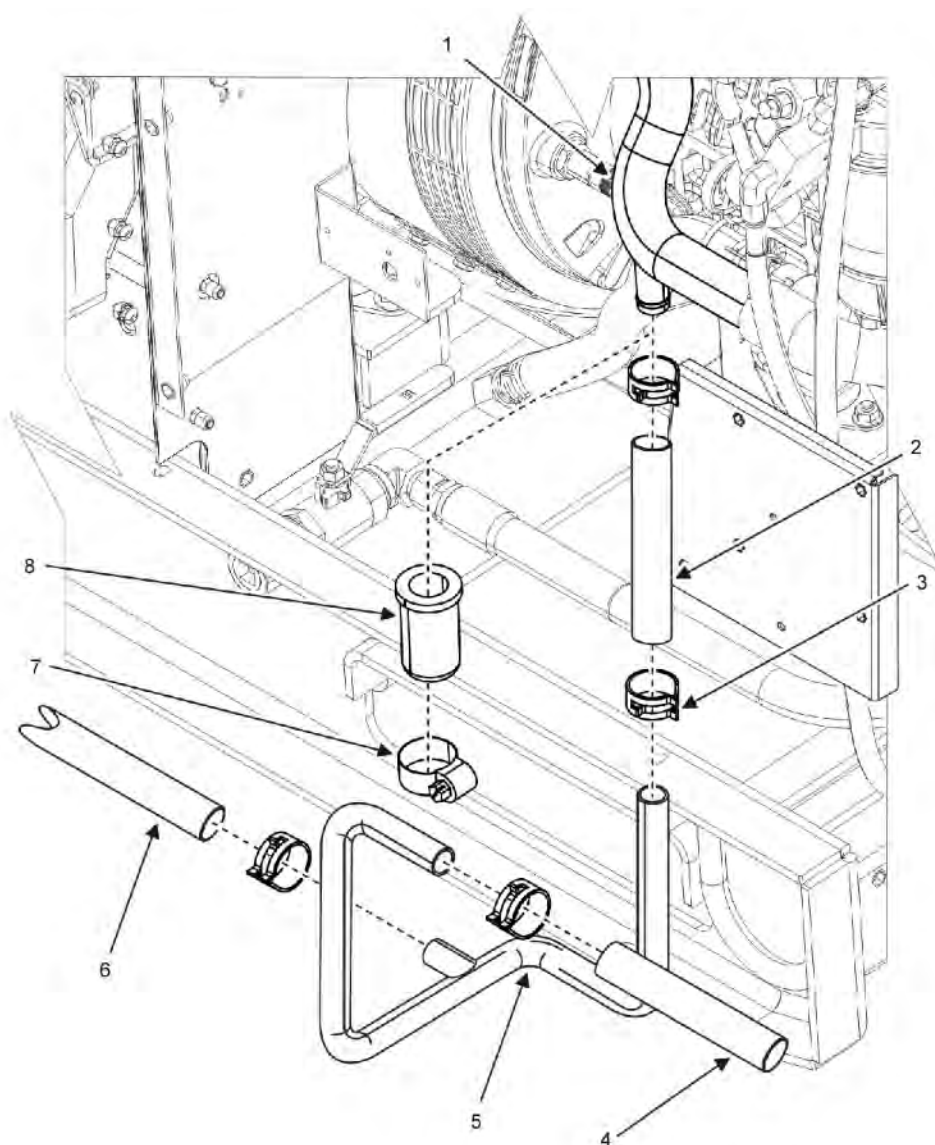


Figure 8. Coolant Heater Outlet Hose Assembly.

13. Prepare coolant heater outlet hose assembly (Figure 2, Item 2).
 - a. Loosen clamp (Figure 8, Item 7) and remove cap (Figure 8, Item 8) from lower radiator tube (Figure 8, Item 1).
 - b. Install flex hose (Figure 8, Item 2) to lower radiator tube (Figure 8, Item 1). Secure with clip (Figure 8, Item 3).
 - c. Install Y-pipe (Figure 8, Item 5) (in orientation shown in Figure 8) to open end of flex hose (Figure 8, Item 2). Secure with clip (Figure 8, Item 3).
 - d. Install coolant drain hose (Figure 8, Item 6) to Y-pipe (Figure 8, Item 5) opening. Secure with clip (Figure 8, Item 3).

INSTALL WINTERIZATION KIT – CONTINUED

- e. Install flex hose (Figure 8, Item 4) to Y-pipe (Figure 8, Item 5) opening. Secure with clip (Figure 8, Item 3).
14. Install coolant heater holder to coolant heater mounting bracket (WP 0025, Remove/Install Winterization Kit Components).
15. Install coolant heater (Figure 2, Item 4), and connect coolant outlet and inlet hose assemblies (Figure 2, Item 2 and 6), fuel lines (Figure 2, Item 3), air exhaust tube (Figure 2, Item 1), and electrical connector (not shown) (WP 0025, Remove/Install Winterization Kit Components).
16. Tighten screws (Figure 6, Item 3) and nuts (Figure 6, Item 1) securing clamps (Figure 2, Items 5, 7, and 8) that secure air exhaust tube (Figure 2, Item 1) to unit skid and bulkhead.
17. Fill cooling system (WP 0021, Service Cooling System).
18. Install top body panel (WP 0028, Remove/Install Top Body Panel).

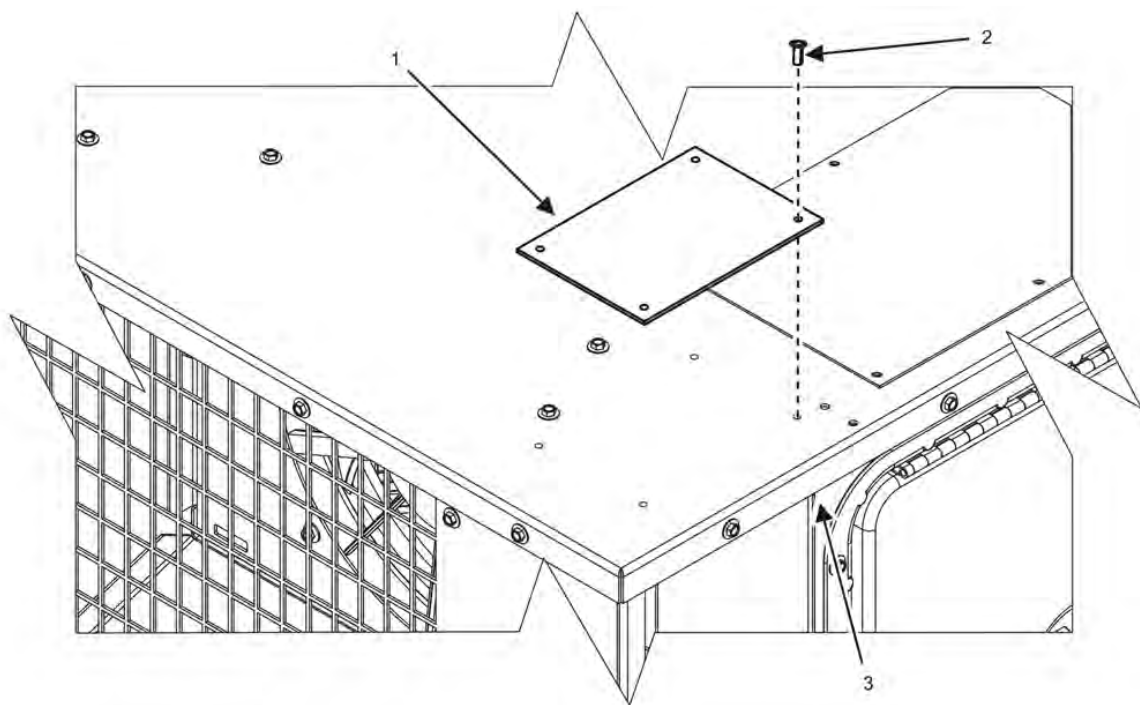


Figure 9. Operating Instructions Plate - Installation.

19. Drill four holes of 3.5 mm diameter in rear-left of top body panel (Figure 9, Item 3) using existing holes in operating instructions plate (Figure 9, Item 1) as a guide.
20. Rivet operating instructions plate (Figure 9, Item 1) to rear-left corner of top body panel (Figure 9, Item 3) with four blind rivets (Figure 9, Item 2).
21. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
22. Close and secure generator set doors.
23. Ensure fluid level is at proper operating level (TM 9-6115-749-10).
24. Release air through overflow vent line for 5 min before start-up (TM 9-6115-749-10).
25. Purge fuel system (WP 0039, Service Fuel System).
26. Test winterization kit (WP 0025, Remove/Install Winterization Kit Components).

INSTALL WINTERIZATION KIT – CONTINUED

27. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
28. Start engine and check for proper operation (TM 9-6115-749-10).
29. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

REMOVE/INSTALL RADIATOR

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
 Wrench, Torque, Dial, 3/8 in Drive, 300 in•lb (WP 0162, Table 2, Item 43)

Personnel Required

91D (1)
 Assistant (1)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool
 Battery ground cable removed (WP 0036, Remove/Install Batteries)
 Top body panel removed (WP 0028, Remove/Install Top Body Panel)
 Cooling system drained (WP 0021, Service Cooling System)
 Upper and lower radiator hoses removed from radiator (WP 0024, Remove/Install Radiator Hose and Tube Assemblies)
 Coolant overflow hose removed from radiator (WP 0022, Remove/Install Coolant Recovery System)

Materials/Parts

Radiator assembly (WP 0108, Item 9)
 Antifreeze, ethylene glycol (WP 0163, Table 1, Item 2)
 Cap set, protective (WP 0163, Table 1, Item 8)
 Distilled water (WP 0163, Table 1, Item 17)
 Grease, electrically conductive (WP 0163, Table 1, Item 20)
 Pan, drain (WP 0163, Table 1, Item 28)
 Rag, wiping (WP 0163, Table 1, Item 31)
 Soap, Ivory (WP 0163, Table 1, Item 33)

REMOVE/INSTALL RADIATOR**WARNING**

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

WARNING

Hot coolant can burn. If the radiator cap is hot to the touch, it is too hot to open. Allow the coolant to cool before opening the radiator cap. Wear gloves, additional protective clothing, and goggles as required. Contact with high-pressure steam and/or liquids can cause burns and scalding. Failure to comply may cause injury or death to personnel.

WARNING

Engine coolant is toxic to eyes and poisonous if ingested. Eye protection is required when working with engine coolant. Avoid repeated or prolonged contact. Failure to comply may cause injury or death to personnel.

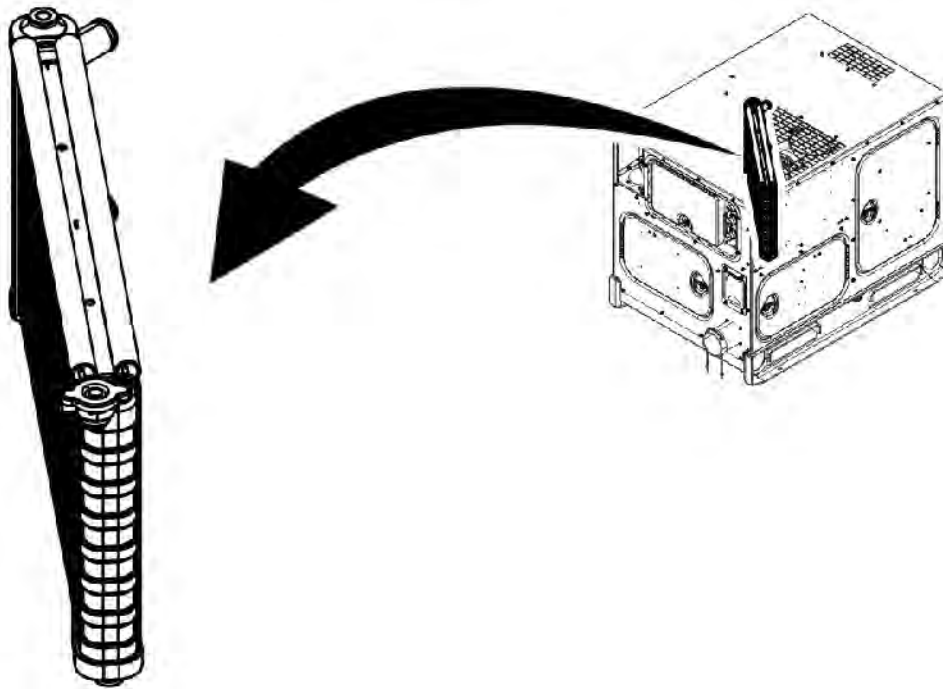
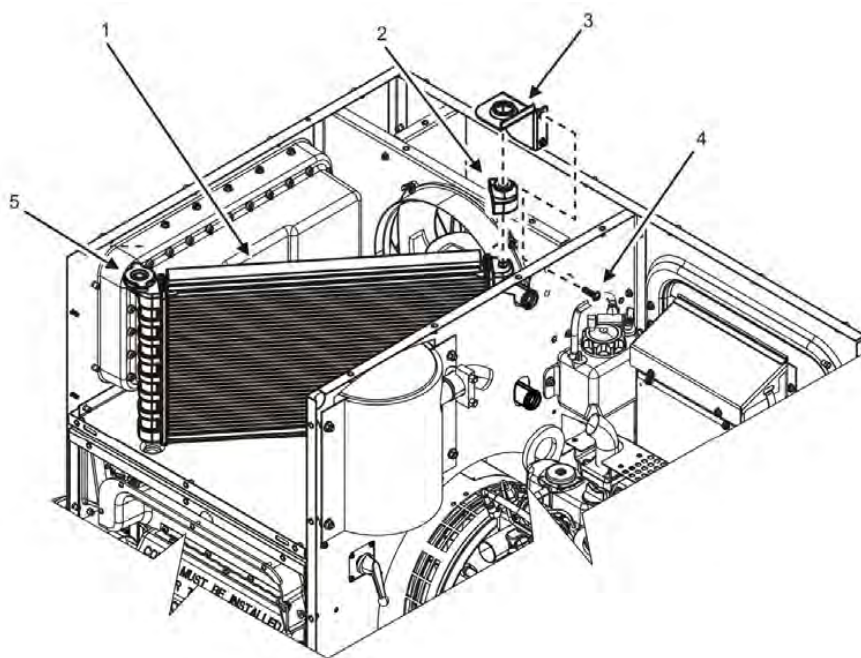
REMOVE/INSTALL RADIATOR – CONTINUED**Remove Radiator**

Figure 1. Radiator - Location.

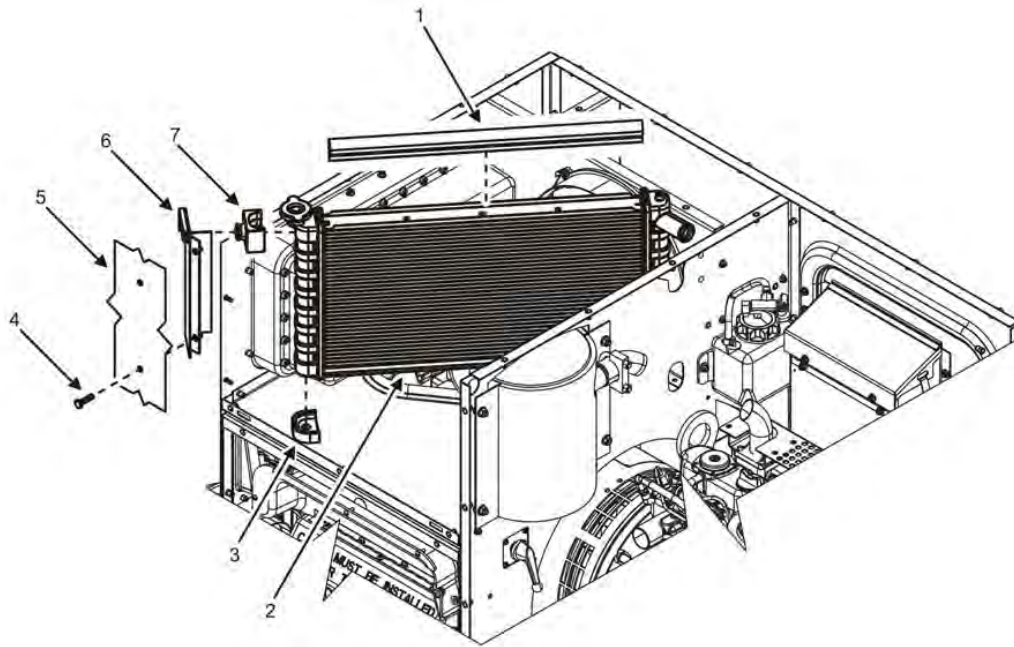
1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate radiator (Figure 1).

REMOVE/INSTALL RADIATOR – CONTINUED

**Figure 2. Radiator Removal - Forward.****NOTE**

Capture any spilled residual coolant and dispose of IAW local SOP. Cap/plug all open coolant hoses and ports to minimize spilled residual coolant when radiator is removed. Caps/plugs also prevent dirt and debris from entering the cooling system.

3. Ensure radiator cap (Figure 2, Item 5) is installed on radiator (Figure 2, Item 1) to minimize residual coolant spilled when radiator is removed.
4. Remove two screws (Figure 2, Item 4) securing front radiator bracket (Figure 2, Item 3) and rubber isolator (Figure 2, Item 2) to unit bulkhead panel.
5. Inspect front radiator bracket (Figure 2, Item 3) and rubber isolator (Figure 2, Item 2) for corrosion, excessive wear, or other signs of obvious damage. Replace components as required.

REMOVE/INSTALL RADIATOR – CONTINUED**Figure 3. Radiator Removal - Rear.**

6. Remove two screws (Figure 3, Item 4) that secure rear radiator bracket (Figure 3, Item 6) to right-side body panel (Figure 3, Item 5).
7. Remove rear radiator bracket (Figure 3, Item 6) and rubber isolator (Figure 3, Item 7).
8. Inspect rear radiator bracket (Figure 3, Item 6) and rubber isolator (Figure 3, Item 7) for corrosion, excessive wear, or other signs of obvious damage. Replace components as required.
9. Remove four rubber edge bulb seals (Figure 3, Item 1) from radiator (Figure 3, Item 2).
10. Inspect four rubber edge bulb seals (Figure 3, Item 1) for cuts, tears, brittleness, and other damage. Replace rubber edge bulb seals (Figure 3, Item 1) if cut, torn, brittle, or otherwise damaged.
11. Remove radiator (Figure 3, Item 2) from unit, and place on suitable work surface.

END OF TASK**Inspect/Clean Radiator**

1. Remove dirt and debris from radiator (Figure 3, Item 2) exterior.
2. Remove rubber mounts (Figure 3, Item 3) from bottom of radiator (Figure 3, Item 2).
3. Inspect rubber mounts (Figure 3, Item 3) for excessive wear or other signs of obvious damage. Replace rubber mounts (Figure 3, Item 3) as required.
4. Inspect radiator (Figure 3, Item 2) for punctures, tears, cracks, crushed fins, or damage to inlet, outlet, or overflow ports.
5. Inspect seams of radiator (Figure 3, Item 2) where side tanks meet radiator core for signs of leakage.
6. Replace radiator (Figure 3, Item 2) if any evidence of damage is found.

END OF TASK

REMOVE/INSTALL RADIATOR – CONTINUED**Install Radiator**

1. Wipe down all components using wiping rags prior to installation.

NOTE

The radiator support tray contains two indentations to cradle the rubber mounts (Figure 3, Item 3).

2. Ensure rubber mounts (Figure 3, Item 3) are installed to bottom of radiator (Figure 3, Item 2).
3. Position radiator (Figure 3, Item 2) inside unit with rubber mounts (Figure 3, Item 3) located in support tray indentations.
4. Insert intake and outlet fittings of radiator (Figure 3, Item 2) through openings in unit bulkhead panel.
5. Position rubber isolator (Figure 3, Item 7) and rear radiator bracket (Figure 3, Item 6) to mounting location on radiator (Figure 3, Item 2) and right-side body panel (Figure 3, Item 5).
6. Install two screws (Figure 3, Item 4) finger-tight to secure rear radiator bracket (Figure 3, Item 6) to right-side body panel (Figure 3, Item 5).
7. Install two rubber edge bulb seals (Figure 3, Item 1) to top and two to bottom of radiator (Figure 3, Item 2).
8. Position rubber isolator (Figure 2, Item 2) and front radiator bracket (Figure 2, Item 3) to mounting location on radiator (Figure 2, Item 1) at bulkhead panel.
9. Install two screws (Figure 2, Item 4) finger-tight to secure front radiator bracket (Figure 2, Item 3) to bulkhead panel.
10. Torque screws (Figure 3, Item 4) (Figure 2, Item 4) to 87-105 in•lb (10-11 N•m).
11. Remove all caps/plugs from radiator ports and hoses prior to installation.
12. Install coolant overflow hose (WP 0022, Remove/Install Coolant Recovery System) to radiator (Figure 2, Item 1).
13. Install upper and lower radiator hoses to radiator (Figure 2, Item 1) (WP 0024, Remove/Install Radiator Hose and Tube Assemblies).
14. Fill cooling system (WP 0021, Service Cooling System) to proper level and ensure radiator cap is properly installed.
15. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
16. Close all generator set doors.

WARNING

Hearing protection is required during maintenance or repair with engine running. Failure to comply can cause hearing loss.

CAUTION

Operating generator set with doors open or with panels removed for an extended length of time will cause engine to overheat. Do not operate generator with doors open or panels removed for longer than necessary to complete your task. Monitor DCS temperature indicator to prevent engine overheating. Failure to comply will cause damage to equipment.

NOTE

Install top body panel after unit has been checked for leaks.

17. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).

REMOVE/INSTALL RADIATOR – CONTINUED

18. Bring coolant to normal operating temperature and then apply a 100% rated load for 30 min (TM 9-6115-749-10).
19. Check for leaks and repair as required.
20. Install top body panel (WP 0028, Remove/Install Top Body Panel).

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
REMOVE/INSTALL TOP BODY PANEL

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
Wrench, Torque, Dial, 3/8 in Drive, 300 in•lb (WP 0162, Table 2, Item 43)

Materials/Parts

Panel, top (WP 0102, Item 2)
Grease, electrically conductive (WP 0163, Table 1, Item 20)

Personnel Required

91D (1)
Assistant (1)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)

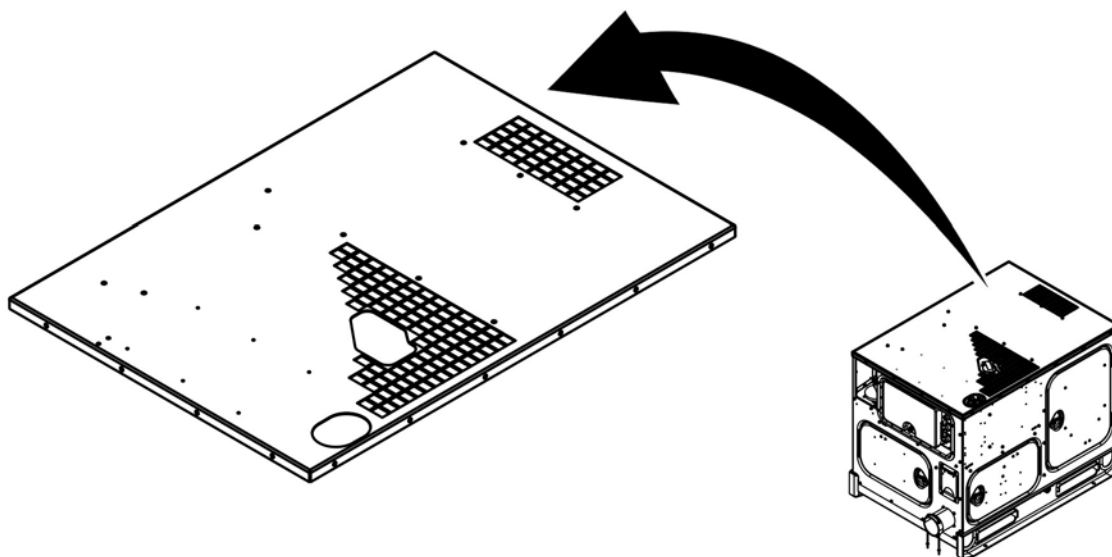
REMOVE/INSTALL TOP BODY PANEL**Remove Top Body Panel**

Figure 1. Top Body Panel - Location.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate top body panel (Figure 1).

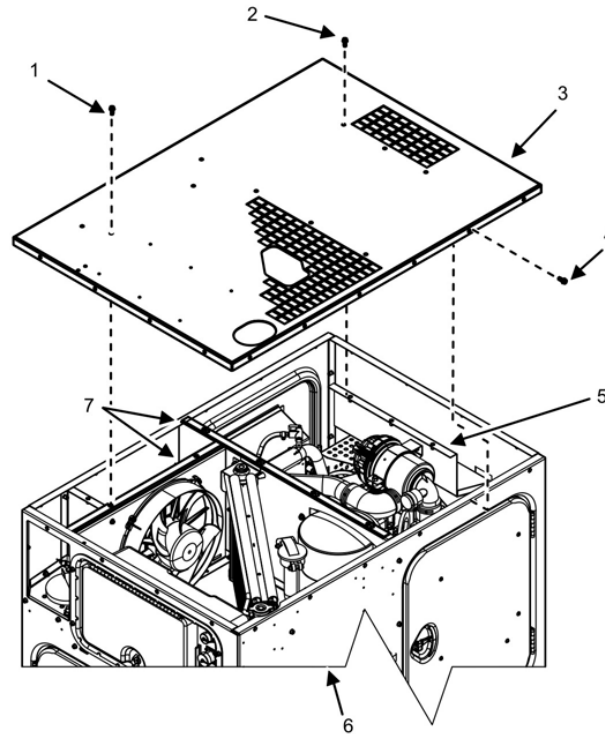
REMOVE/INSTALL TOP BODY PANEL – CONTINUED

Figure 2. Top Body Panel Removal - Detail.

3. Remove 20 screws (Figure 2, Item 4) securing edges of top body panel (Figure 2, Item 3) to generator set (Figure 2, Item 6).
4. Remove seven screws (Figure 2, Item 1) securing top body panel (Figure 2, Item 3) to internal body panels (Figure 2, Item 7) of generator set (Figure 2, Item 6).
5. Remove three screws (Figure 2, Item 2) securing weather shield (Figure 2, Item 5) to top body panel (Figure 2, Item 3).
6. Remove top body panel (Figure 2, Item 3) from unit, and place on flat surface to prevent damage to panel.

END OF TASK**Inspect Top Body Panel**

1. Inspect top body panel (Figure 2, Item 3) for damage, cracks, or corrosion, and repair minor damage as required.
2. Replace top body panel (Figure 2, Item 3) if cracked or showing major damage.
3. Inspect screws (Figure 2, Items 1, 2, and 4) for damage, and replace any that are damaged.
4. Inspect weather shield (Figure 2, Item 5) for cracks, damage, or corrosion, and repair minor damage as required.
5. Replace weather shield (Figure 2, Item 5) if cracked, corroded, or showing major damage.

END OF TASK

REMOVE/INSTALL TOP BODY PANEL – CONTINUED**Install Top Body Panel**

1. Position top body panel (Figure 2, Item 3) on generator set (Figure 2, Item 6), and align mounting holes.
2. Install and finger-tighten 20 screws (Figure 2, Item 4) securing top body panel (Figure 2, Item 3) along perimeter of unit.
3. Install and finger-tighten seven screws (Figure 2, Item 1) securing top body panel (Figure 2, Item 3) to internal panels (Figure 2, Item 7) of unit.
4. Install and finger-tighten three screws (Figure 2, Item 2) securing weather shield (Figure 2, Item 5) to top body panel (Figure 2, Item 3).
5. Torque all screws installed in Steps 2, 3, and 4 to 86-106 in•lb (10-12 N•m).
6. Install battery ground cable (WP 0036, Remove/Install Batteries).
7. Close generator set doors.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**REMOVE/INSTALL FRONT BODY PANEL**

INITIAL SETUP:**Tools and Special Tools**

Hex Key 5.0 mm (WP 0162, Table 2, Item 16)
Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
Wrench, Torque, Dial, 3/8 in Drive, 300 in•lb (WP 0162, Table 2, Item 43)

Personnel Required

91D (1)
Assistant (1)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)
Top body panel removed (WP 0028, Remove/Install Top Body Panel)
NATO slave receptacle disconnected (WP 0038, Remove/Install NATO Slave Receptacle)
Air cleaner assembly air hoses removed (WP 0019, Remove/Install Air Intake Hose Assemblies)
Fuel filter/water separator separated from front body panel (WP 0042, Remove/Install Fuel Filter/Water Separator Assembly)

Materials/Parts

Panel, enclosure, front (WP 0102, Item 19)
Cap set, protective (WP 0163, Table 1, Item 8)
Grease, electrically conductive (WP 0163, Table 1, Item 20)
Rag, wiping (WP 0163, Table 1, Item 31)
Strap, tiedown (WP 0163, Table 1, Item 34)

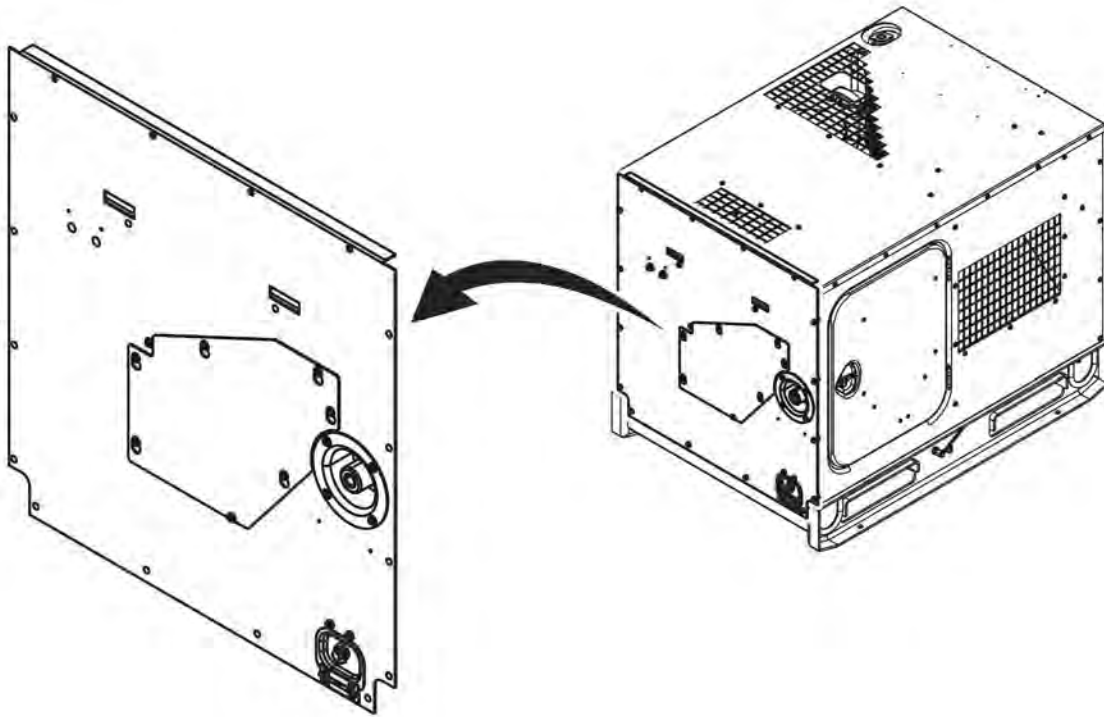
REMOVE/INSTALL FRONT BODY PANEL**Remove Front Body Panel**

Figure 1. Front Body Panel - Location.

1. Ensure equipment conditions are met in order presented in initial setup.

CAUTION

When the front body panel (Figure 1) is removed, the NATO slave receptacle (Figure 3, Item 5), weather shield (Figure 3, Item 1), engine belt shields (Figure 3, Items 3 and 6), and air cleaner (Figure 3, Item 2) will remain attached to the front body panel. Handle the panel carefully when removing. Failure to comply may cause damage to equipment.

NOTE

The access panel (Figure 2, Item 3) does not need to be removed to remove or install the front body panel.

2. Remove 12 screws (Figure 2, Item 2) securing front body panel (Figure 2, Item 1) to unit.

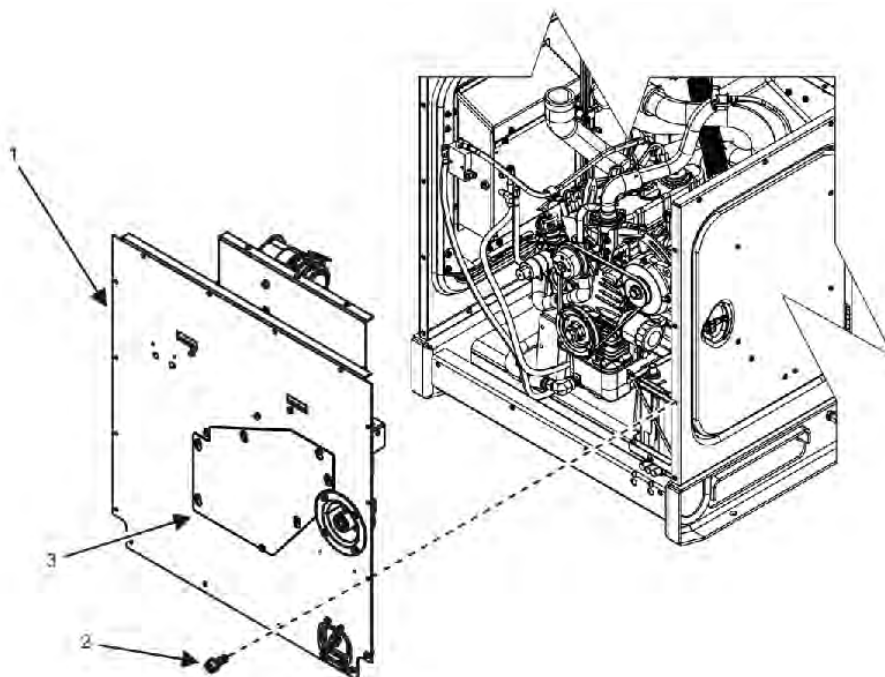
REMOVE/INSTALL FRONT BODY PANEL – CONTINUED

Figure 2. Front Body Panel - Removal/Installation.

3. Remove front body panel (Figure 2, Item 1) from generator set and place on suitable work surface.

END OF TASK**Inspect Front Body Panel**

1. Inspect front body panel (Figure 2, Item 1) for damage or corrosion.
2. Repair minor damage or corrosion as required.
3. Replace front body panel (Figure 2, Item 1) if significant damage or corrosion is present.
4. Inspect mounting hardware, and replace as required.
5. Inspect NATO slave receptacle (Figure 3, Item 5), engine belt shields (Figure 3, Items 3 and 6), weather shield (Figure 3, Item 1), grounding rods door (Figure 3, Item 4), and air cleaner (Figure 3, Item 2) for signs of corrosion or damage, and repair or replace as required.

END OF TASK

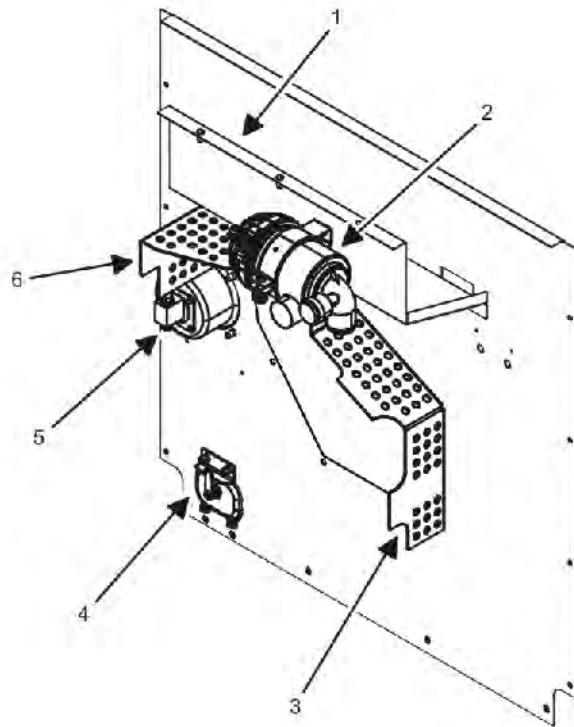
REMOVE/INSTALL FRONT BODY PANEL – CONTINUED**Install Front Body Panel**

Figure 3. Front Body Panel - Reverse.

1. Place front body panel (Figure 2, Item 1) at mounting location on unit, and align mounting holes.
2. Install front body panel (Figure 2, Item 1) with 12 screws (Figure 2, Item 2). Torque screws to 86-106 in•lb (10-12 N•m).
3. Remove plugs from air hoses, and install hoses to air cleaner assembly (WP 0019, Remove/Install Air Intake Hose Assemblies).

WARNING

NATO slave receptacle is electrically live at all times and is not protected by a fuse. Disconnecting main Direct Current (DC) circuit breaker does not ensure the circuit is dead. This circuit is only dead when the batteries are fully disconnected. Disconnect both batteries before performing maintenance on the slave receptacle. Failure to comply may cause injury or death to personnel.

4. Install NATO slave receptacle positive and negative connections (WP 0038, Remove/Install NATO Slave Receptacle).
5. Install fuel filter/water separator assembly (WP 0042, Remove/Install Fuel Filter/Water Separator Assembly) onto front body panel (Figure 2, Item 1) using screws and nuts from Remove Front Body Panel task.
6. Install top body panel (WP 0028, Remove/Install Top Body Panel).
7. Install battery ground cable (WP 0036, Remove/Install Batteries).
8. Close generator set doors.
9. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
10. Start engine and check for proper operation (TM 9-6115-749-10).

REMOVE/INSTALL FRONT BODY PANEL – CONTINUED

11. Repair as required.
12. Dispose of all captured fluids IAW local SOP.

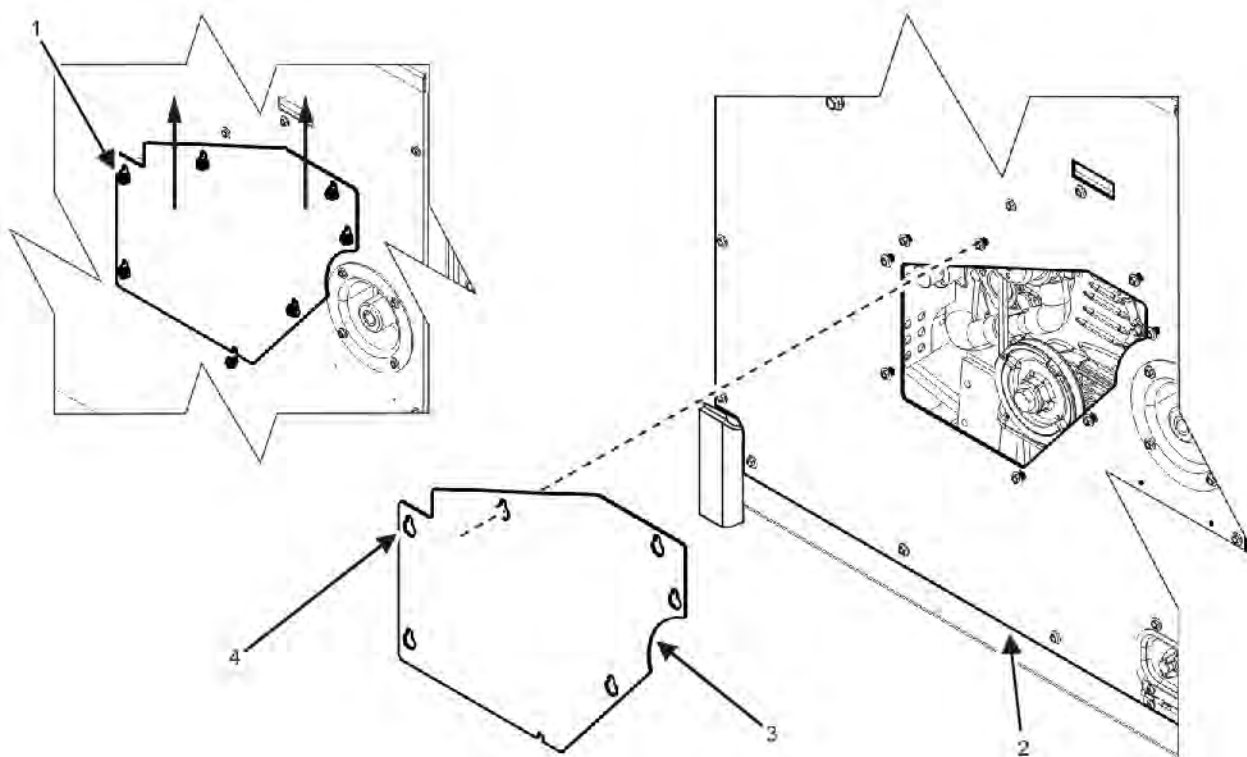
END OF TASK**Remove Access Panel**

Figure 4. Remove Access Panel.

1. Turn seven screws (Figure 4, Item 1) securing access panel (Figure 2, Item 3) 2.5 turns counterclockwise.
2. Move access panel (Figure 4, Item 3) upwards until screws (Figure 4, Item 1) are centered in circular part of key-hole openings (Figure 4, Item 4).
3. Remove access panel (Figure 4, Item 3).
4. Inspect access panel (Figure 4, Item 3) for damage and corrosion. Repair or replace as required.

END OF TASK**Install Access Panel**

1. Position access panel as shown in Figure 4.
2. Position access panel key-hole openings (Figure 4, Item 4) over screws (Figure 4, Item 1) on front panel (Figure 4, Item 2).
3. Slide access panel (Figure 4, Item 3) downwards until narrow portion of key-hole openings (Figure 4, Item 4) rest on screws (Figure 4, Item 1).

REMOVE/INSTALL FRONT BODY PANEL – CONTINUED

4. Turn seven screws (Figure 4, Item 1) clockwise 2.5 turns.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

REMOVE/INSTALL REAR BODY PANEL

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
Wrench, Torque, Dial, 3/8 in Drive, 300 in•lb (WP 0162, Table 2, Item 43)

Materials/Parts

Panel, rear (WP 0102, Item 45)
Grease, electrically conductive (WP 0163, Table 1, Item 20)
Washer, lock (WP 0102, Item 32)
Tag, marker (WP 0163, Table 1, Item 35)

Personnel Required

91D (1)
Assistant (1)

References

WP 0033, Remove/Install Door
WP 0056, Remove/Install Convenience Receptacle

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)
Top body panel removed (WP 0028, Remove/Install Top Body Panel)
DCS panel removed (WP 0017, Remove/Install DCS)

REMOVE/INSTALL REAR BODY PANEL

Remove Rear Body Panel

NOTE

DCS door and rear access door are attached to rear body panel. Rear body panel may be removed from the unit with or without the doors attached. See WP 0033, Remove/Install Door for procedure to remove/install DCS and rear access doors.

The DCS, mounted in the rear body panel (Figure 1), has a cover that can be closed over the panel and latched. To improve clarity, illustrations in this document show the DCS unit without the cover.

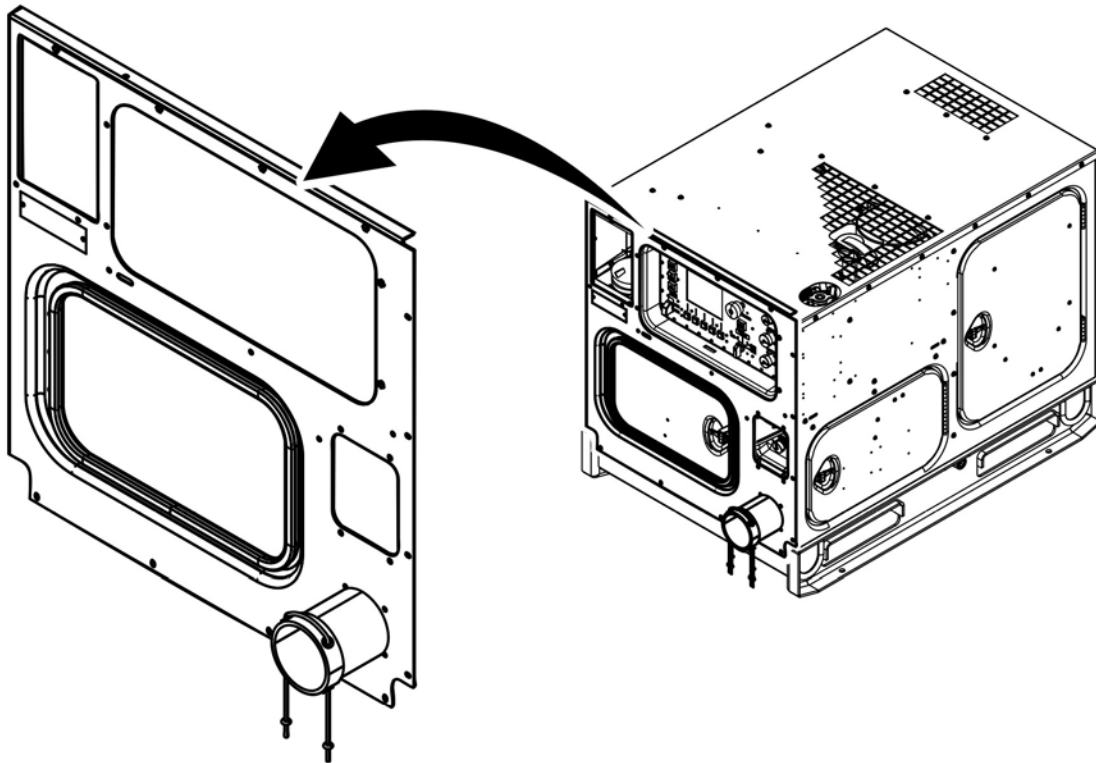
REMOVE/INSTALL REAR BODY PANEL – CONTINUED

Figure 1. Rear Body Panel - Location.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate rear body panel (Figure 1).

REMOVE/INSTALL REAR BODY PANEL – CONTINUED

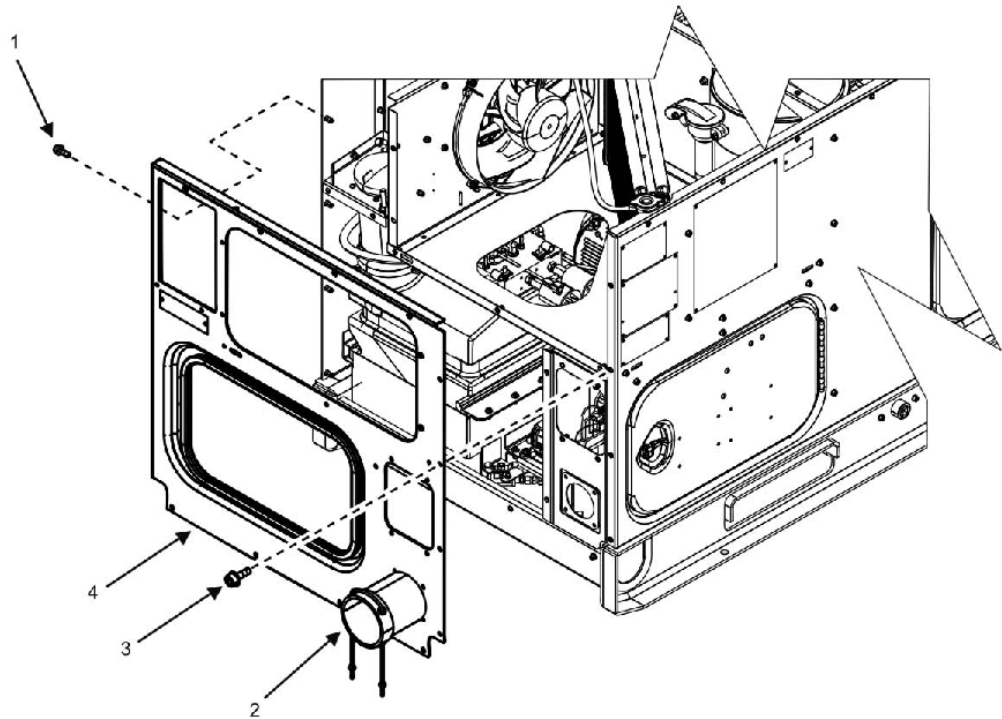


Figure 2. Rear Body Panel Removal - Detail.

3. Tag and disconnect all output cables from output box (TM 9-6115-749-10), and withdraw cables through cable outlet (Figure 2, Item 2) in rear body panel.
4. Remove four screws (Figure 2, Item 1) securing left-side body panel to rear body panel (Figure 2, Item 4).
5. Remove eight screws (Figure 2, Item 3) securing rear body panel (Figure 2, Item 4) to perimeter of unit.

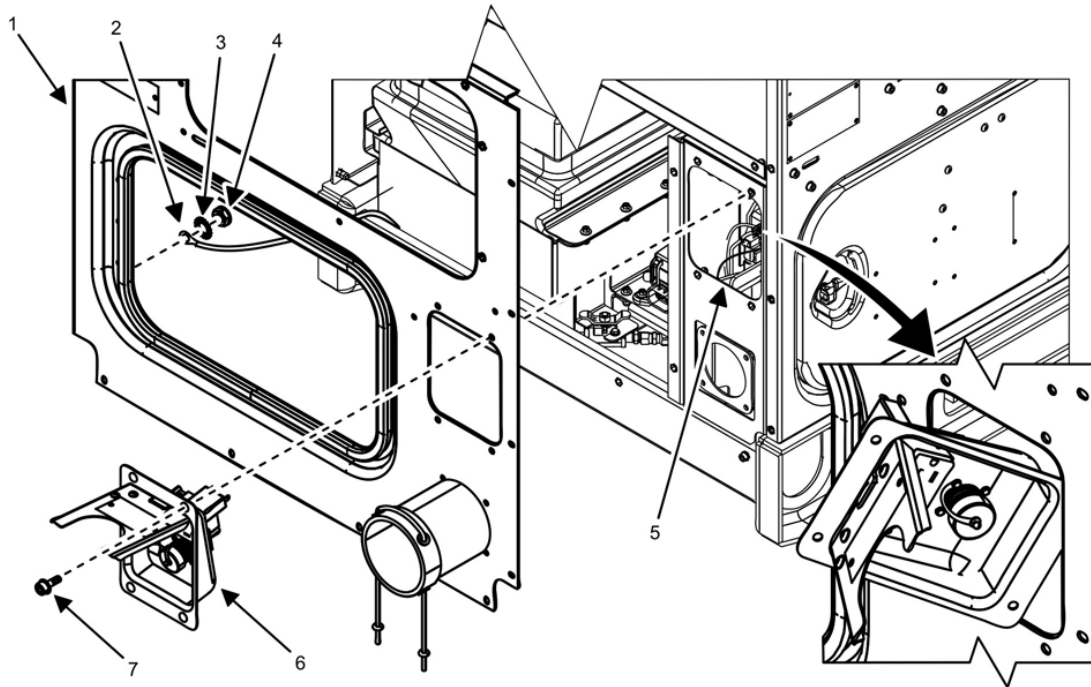
REMOVE/INSTALL REAR BODY PANEL – CONTINUED

Figure 3. Convenience Receptacle Removal - Detail.

6. Remove four screws (Figure 3, Item 7) securing convenience receptacle (Figure 3, Item 6) to rear body panel (Figure 3, Item 1).
7. Disengage convenience receptacle (Figure 3, Item 6) from rear body panel (Figure 3, Item 1) carefully so as to not damage or stress any electrical connections.

CAUTION

When removing the final screws from the rear body panel (Figure 3, Item 1), be sure to support the panel and not allow it to fall. Failure to comply may cause damage to equipment.

8. Remove seven screws (Figure 2, Item 3) securing rear body panel (Figure 2, Item 4) to interior panels.
9. Remove rear body panel (Figure 3, Item 1) from unit, passing convenience receptacle (Figure 3, Item 6) diagonally through panel opening as panel is removed.
10. Remove nut (Figure 3, Item 4) and lockwasher (Figure 3, Item 3) securing ground wire (Figure 3, Item 2) to rear body panel (Figure 3, Item 1). Discard lockwasher (Figure 3, Item 3).
11. Remove ground wire (Figure 3, Item 2) from rear body panel (Figure 3, Item 1).
12. Place rear body panel (Figure 3, Item 1) on suitable work surface.
13. Place convenience receptacle (Figure 3, Item 6) at its mounting location, and install a single screw (Figure 3, Item 7) to hold convenience receptacle in place against output box (Figure 3, Item 5).

END OF TASK**Inspect Rear Body Panel**

1. Inspect rear body panel (Figure 3, Item 1) for damage or corrosion.

REMOVE/INSTALL REAR BODY PANEL – CONTINUED

2. Repair minor damage and corrosion as required.
3. Replace rear body panel (Figure 3, Item 1) if major damage or corrosion are present.
4. Inspect door on rear body panel for damage.
5. Replace door as required (WP 0033, Remove/Install Door).
6. Inspect convenience receptacle (Figure 3, Item 6) for damage, and replace if damaged (WP 0056, Remove/Install Convenience Receptacle).
7. Inspect all mounting hardware, and replace as required.

END OF TASK**Install Rear Body Panel****NOTE**

The left edge of the rear body panel (Figure 3, Item 1) fits beneath the edge of the left-side body panel.

1. Remove screw (Figure 3, Item 7) securing convenience receptacle (Figure 3, Item 6) to output box (Figure 3, Item 5).
2. Place rear body panel (Figure 3, Item 1) on unit allowing convenience receptacle (Figure 3, Item 6) to pass diagonally out through receptacle opening in panel.
3. Install ground wire (Figure 3, Item 2), nut (Figure 3, Item 4), and new lockwasher (Figure 3, Item 3) to rear body panel (Figure 3, Item 1).
4. Position rear body panel (Figure 3, Item 1) at mounting holes.
5. Install and finger-tighten seven screws (Figure 2, Item 3) securing rear body panel (Figure 2, Item 4) to interior panels.
6. Install and finger-tighten eight screws (Figure 2, Item 3) securing rear body panel (Figure 2, Item 4) to perimeter of unit.
7. Install and finger-tighten four screws (Figure 3, Item 7) securing convenience receptacle (Figure 3, Item 6) to rear body panel (Figure 3, Item 1).
8. Install and finger-tighten four screws (Figure 2, Item 1) securing left-side panel (not shown) to rear body panel (Figure 3, Item 1).
9. Torque all screws to 86-106 in•lb (10-12 N•m).
10. Install DCS panel (WP 0017, Remove/Install DCS).
11. Install top body panel (WP 0028, Remove/Install Top Body Panel).
12. Install all output cables to proper locations in output box and remove tags (TM 9-6115-749-10).
13. Install battery ground cable (WP 0036, Remove/Install Batteries).
14. Close generator set doors.
15. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
16. Start engine and check for proper operation (TM 9-6115-749-10).
17. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**REMOVE/INSTALL LEFT-SIDE BODY PANEL**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
Wrench, Torque, Dial, 3/8 in Drive, 300 in•lb (WP 0162, Table 2, Item 43)

Materials/Parts

Panel, left (WP 0102, Item 73)
Washer, lock (WP 0102, Item 32)
Grease, electrically conductive (WP 0163, Table 1, Item 20)

Personnel Required

91D (1)
Assistant (1)

References

WP 0033, Remove/Install Door
WP 0034, Repair Door

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)
Top body panel removed (WP 0028, Remove/Install Top Body Panel)

REMOVE/INSTALL LEFT-SIDE BODY PANEL**WARNING**

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

Remove Left-side Body Panel**NOTE**

Left-side door is attached to left-side body panel (Figure 1). Left-side body panel may be removed from unit with or without left-side door attached. See WP 0033, Remove/Install Door for procedure to remove and install door.

REMOVE/INSTALL LEFT-SIDE BODY PANEL – CONTINUED

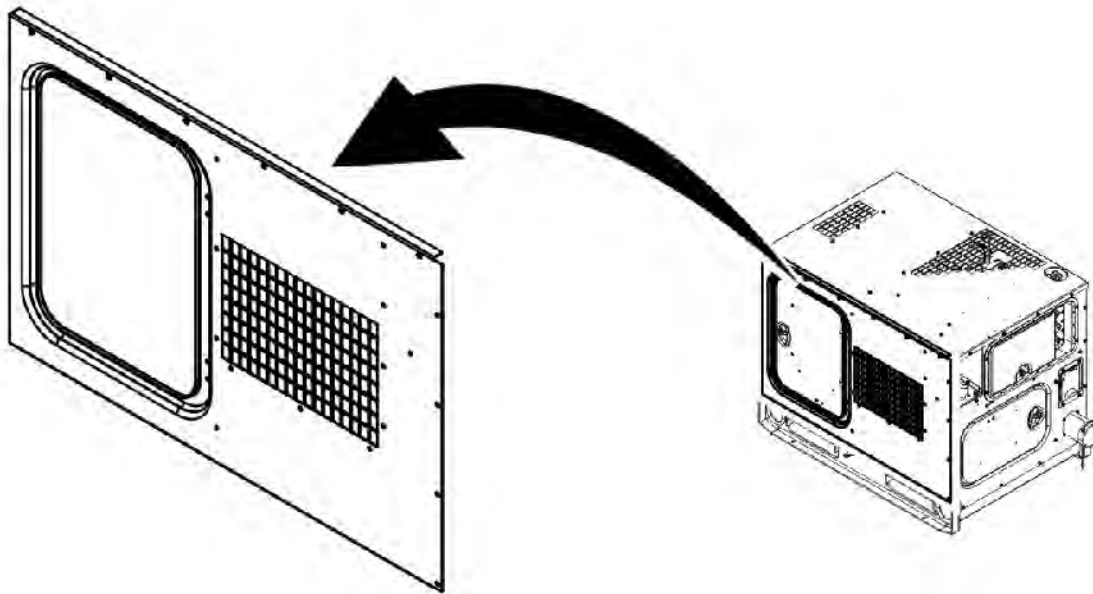


Figure 1. Left-Side Body Panel - Location.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate left-side body panel (Figure 1).

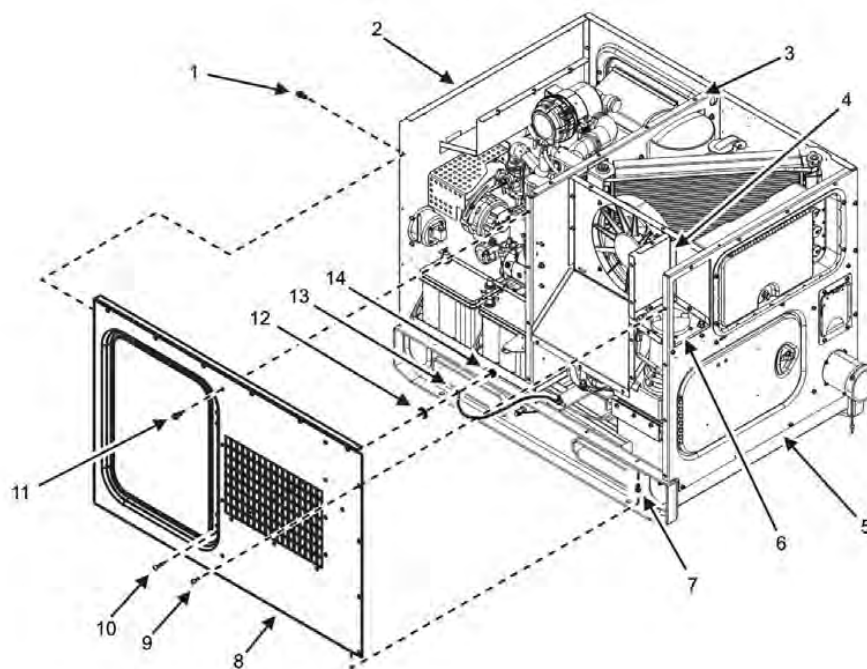


Figure 2. Left-Side Body Panel - Removal.

3. Remove four screws (Figure 2, Item 1) securing battery-side edge of front body panel (Figure 2, Item 2).

REMOVE/INSTALL LEFT-SIDE BODY PANEL – CONTINUED

4. Remove five screws (Figure 2, Item 7) from underneath left-side body panel (Figure 2, Item 8) that secure panel to unit skid.
5. Remove four screws (Figure 2, Item 9) securing left-side body panel (Figure 2, Item 8) to rear body panel (Figure 2, Item 5).
6. Remove 12 screws (Figure 2, Item 10) securing left-side body panel (Figure 2, Item 8) to internal panel (Figure 2, Item 3), fuel system bracket (Figure 2, Item 6), and fuel tank guard (Figure 2, Item 4).
7. Remove screw (Figure 2, Item 11), lockwasher (Figure 2, Item 12), ground wire (Figure 2, Item 13), and nut (Figure 2, Item 14) from left-side body panel (Figure 2, Item 8).
8. Remove left-side body panel (Figure 2, Item 8) from unit, and place on suitable work surface.

END OF TASK**Inspect Left-side Body Panel**

1. Inspect left-side body panel (Figure 2, Item 8) for damage or corrosion, and repair or replace panel as required.
2. Inspect panel door for damage or corrosion, and repair or replace as required (WP 0033, Remove/Install Door and WP 0034, Repair Door).
3. Inspect screws (Figure 2, Items 1, 7, 9, and 10) for damage or corrosion, and replace as required.

END OF TASK**Install Left-side Body Panel**

1. Position left-side body panel (Figure 2, Item 8) at mounting location on unit.
2. Install screw (Figure 2, Item 10), lockwasher (Figure 2, Item 12), ground wire (Figure 2, Item 13) and nut (Figure 2, Item 14) to left-side body panel (Figure 2, Item 8).

NOTE

Install body panel screws finger-tight at first to allow repositioning of panel during installation.

3. Install 12 screws (Figure 2, Item 11) to secure left-side body panel (Figure 2, Item 8) to internal panel (Figure 2, Item 3), fuel system bracket (Figure 2, Item 6), and fuel tank guard (Figure 2, Item 4).
4. Install four screws (Figure 2, Item 9) to secure left-side body panel (Figure 2, Item 8) to rear body panel (Figure 2, Item 5).
5. Install five screws (Figure 2, Item 7) to secure bottom of left-side body panel (Figure 2, Item 8) to unit skid.
6. Install four screws (Figure 2, Item 1) to secure left-side body panel (Figure 2, Item 8) to batteryside edge of front body panel (Figure 2, Item 2).
7. Torque all screws in left-side body panel (Figure 2, Item 8), front body panel (Figure 2, Item 2), and rear body panel (Figure 2, Item 5) to 86-106 in•lb (10-12 N•m).
8. Install top body panel (WP 0028, Remove/Install Top Body Panel).
9. Install battery ground cable (WP 0036, Remove/Install Batteries).
10. Close all generator set doors.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**REMOVE/INSTALL RIGHT-SIDE BODY PANEL**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
Wrench, Torque, Dial, 3/8 in Drive, 300 in•lb (WP 0162, Table 2, Item 43)

Materials/Parts

Panel, right (WP 0102, Item 70)
Grease, electrically conductive (WP 0163, Table 1, Item 20)

Personnel Required

91D (1)
Assistant (1)

References

WP 0033, Remove/Install Door
WP 0034, Repair Door

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)
Top body panel removed (WP 0028, Remove/Install Top Body Panel)

REMOVE/INSTALL RIGHT-SIDE BODY PANEL**WARNING**

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

WARNING

NATO slave receptacle is electrically live at all times and is not protected by a fuse. Disconnecting main Direct Current (DC) circuit breaker does not ensure the circuit is dead. This circuit is only dead when the batteries are fully disconnected. Disconnect both batteries before performing maintenance on the slave receptacle. Failure to comply may cause injury or death to personnel.

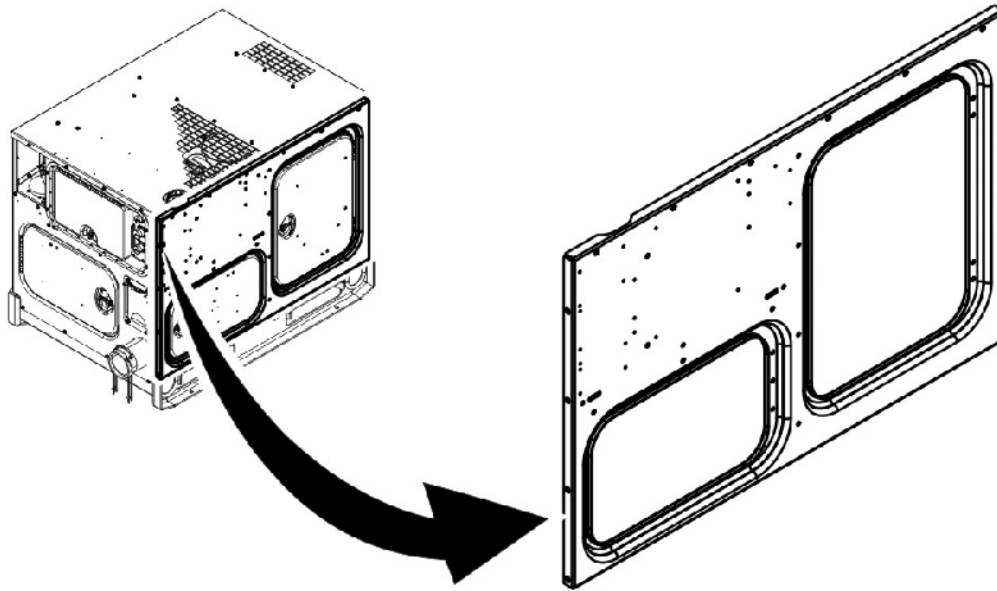
REMOVE/INSTALL RIGHT-SIDE BODY PANEL – CONTINUED**Remove Right-side Body Panel**

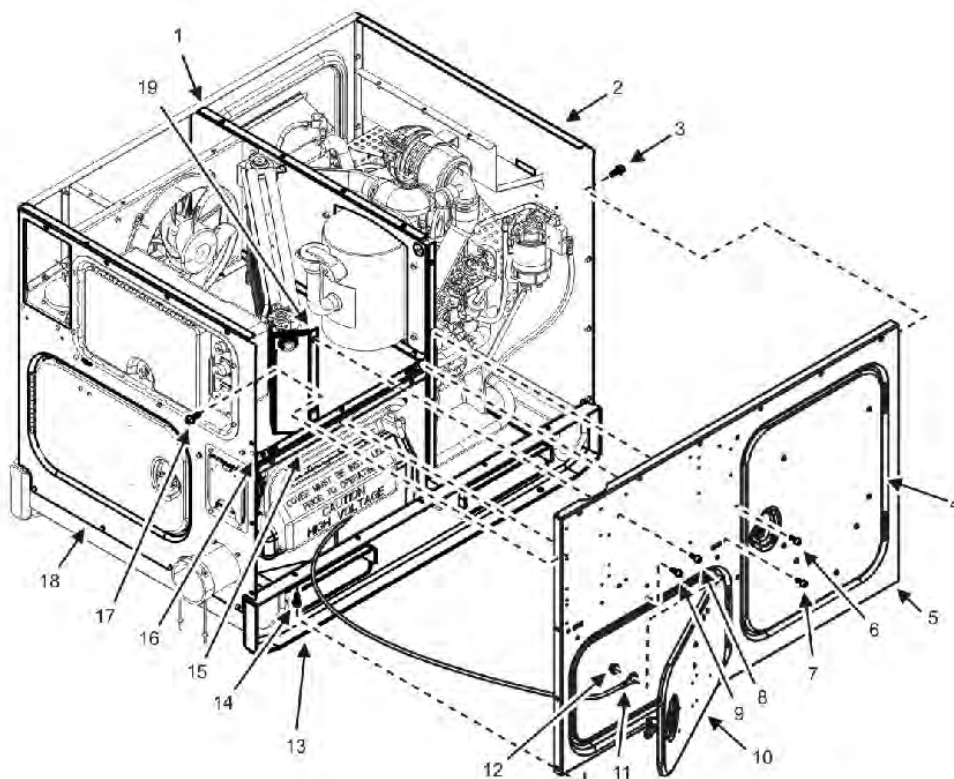
Figure 1. Right-Side Body Panel - Location.

NOTE

Output terminal door and right-side door are attached to right-side body panel (Figure 1). Right-side body panel (Figure 1) may be removed from the unit with or without doors attached. See WP 0034, Repair Door for procedure to remove/install unit access doors. Figure 1 shows the right-side body panel with the doors removed.

1. Ensure all equipment conditions are met in order presented in initial setup.
2. Remove four screws (Figure 2, Item 17) joining rear body panel (Figure 2, Item 18) with right-side body panel (Figure 2, Item 5), and set aside for reuse.

REMOVE/INSTALL RIGHT-SIDE BODY PANEL – CONTINUED

Legend

1	Interior Panel	8	Screws	15	Output Box
2	Front Body Panel	9	Screws	16	Radiator Support Panel
3	Screws	10	Output Box Door	17	Screws
4	Right-side Panel Door	11	Ground Wire	18	Rear Body Panel
5	Right-side Body Panel	12	Nut	19	Radiator Bracket
6	Screws	13	Unit Skid		
7	Screws	14	Screws		

Figure 2. Right-Side Body Panel - Removal.

3. Remove four screws (Figure 2, Item 3) joining front body panel (Figure 2, Item 2) to right-side body panel (Figure 2, Item 5), and set aside for reuse.
4. Remove five screws (Figure 2, Item 14) securing right-side body panel (Figure 2, Item 5) to unit skid (Figure 2, Item 13).
5. Remove six screws (Figure 2, Items 7 and 9) securing right-side body panel (Figure 2, Item 5) to radiator support panel (Figure 2, Item 16) and output box (Figure 2, Item 15).
6. Remove six screws (Figure 2, Items 6 and 8) securing right-side body panel (Figure 2, Item 5) to unit interior panel (Figure 2, Item 1) and rear radiator bracket (Figure 2, Item 19).
7. Remove nut (Figure 2, Item 12) securing ground wire (Figure 2, Item 11) to right-side body panel (Figure 2, Item 5).
8. Remove ground wire (Figure 2, Item 11) from right-side body panel (Figure 2, Item 5).

REMOVE/INSTALL RIGHT-SIDE BODY PANEL – CONTINUED**NOTE**

The output box cover (not shown) is attached to the inside of the output box door (Figure 2, Item 10) and will be removed whenever the right-side body panel (Figure 2, Item 5) is removed with the output box door (Figure 2, Item 10) attached.

9. Remove right-side body panel (Figure 2, Item 5) from unit, and place on suitable work surface.

END OF TASK**Inspect Right-side Body Panel**

1. Check right-side body panel (Figure 2, Item 5) for damage or corrosion.
2. Repair minor damage or corrosion as required.
3. Replace right-side body panel (Figure 2, Item 5) if substantial damage or corrosion is present.
4. Inspect right-side panel door (Figure 2, Item 4) and output box door (Figure 2, Item 10) for damage and proper operation.
5. Repair or replace doors as required (WP 0033, Remove/Install Door and WP 0034, Repair Door).

END OF TASK**Install Right-side Body Panel****NOTE**

Left-hand edge overlap of right-side body panel (Figure 2, Item 5) slides under rear body panel (Figure 2, Item 18) for installation. Right-hand edge overlap fits over front body panel (Figure 2, Item 2).

1. Secure ground wire (Figure 2, Item 11) to right-side body panel (Figure 2, Item 5) with nut (Figure 2, Item 12).
2. Position right-side body panel (Figure 2, Item 5) on unit, and align mounting holes.
3. Install and finger-tighten six screws (Figure 2, Items 6 and 8) securing right-side body panel (Figure 2, Item 5) to unit interior panel (Figure 2, Item 1) and rear radiator bracket (Figure 2, Item 19).
4. Install and finger-tighten six screws (Figure 2, Items 7 and 9) securing right-side body panel (Figure 2, Item 5) to radiator support panel (Figure 2, Item 16) and output box (Figure 2, Item 15).
5. Install and finger-tighten five screws (Figure 2, Item 14) securing right-side body panel (Figure 2, Item 5) to unit skid (Figure 2, Item 13).
6. Install and finger-tighten four screws (Figure 2, Item 3) securing right-side body panel (Figure 2, Item 5) to front body panel (Figure 2, Item 2).
7. Install and finger-tighten four screws (Figure 2, Item 17) securing right-side body panel (Figure 2, Item 5) to rear body panel (Figure 2, Item 18).
8. Torque all screws installed in Steps 3, 4, 5, 6, and 7 to 86-106 in•lb (10-12 N•m).
9. Install top body panel (WP 0028, Remove/Install Top Body Panel).
10. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
11. Close generator set doors.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
REMOVE/INSTALL DOOR

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Materials/Parts - cont'd

Grease, electrically conductive (WP 0163, Table 1, Item 20)

Materials/Parts

Brace, door stay, bottom (WP 0102, Item 26)
 Brace, door stay, top (WP 0102, Item 25)
 Bracket, door (WP 0102, Item 22)
 Bracket, left and right door stay (WP 0102, Item 57)
 Bracket, output box door stay (WP 0102, Item 46)
 Door, assembly (WP 0102, Item 34)
 Door, assembly, right and left (WP 0102, Item 59)
 Door, output box assembly (WP 0102, Item 49)
 Link, door (WP 0102, Item 23)
 Washer, lock (WP 0102, Item 32)

Personnel Required

91D (1)

References

WP 0034, Repair Door

Equipment Condition

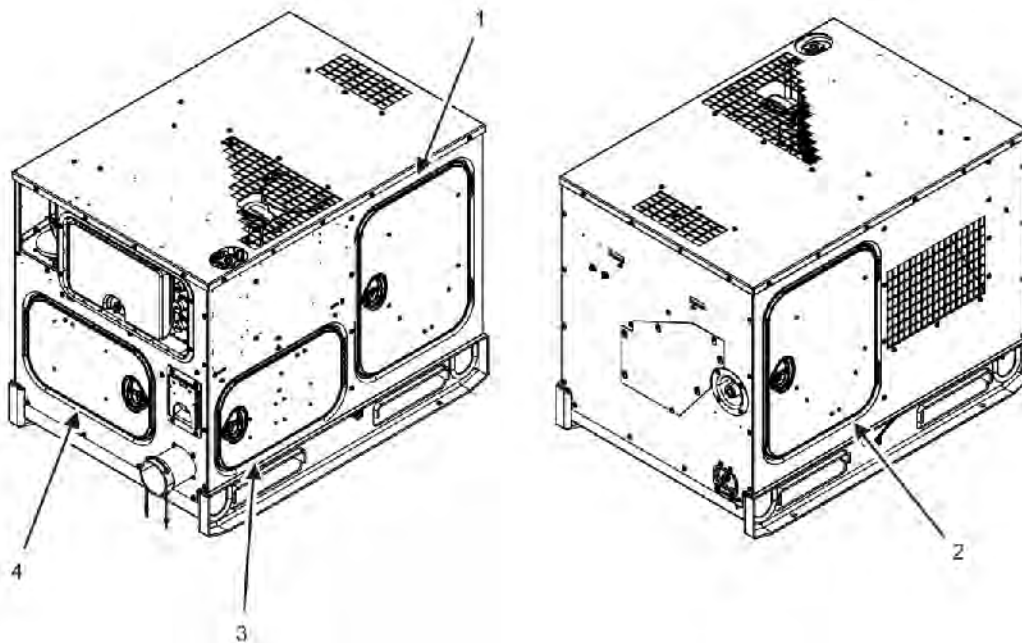
Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool
 Battery ground cable removed (WP 0036, Remove/Install Batteries)

REMOVE/INSTALL DOOR**WARNING**

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

REMOVE/INSTALL DOOR – CONTINUED

Remove Door



Legend

- 1 Right-side Door
- 2 Left-side Door

- 3 Output Box Door

- 4 Rear Panel Door

Figure 1. Door Locations.

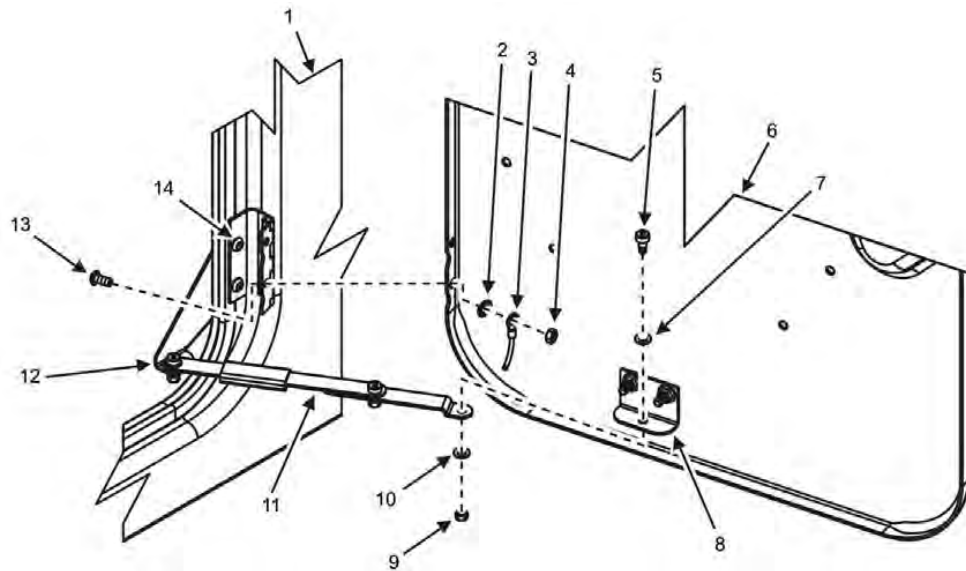
NOTE

Four doors are installed on the AMMPS 5 kW generator set (Figure 1, Items 1 through 4). Each door may be removed with its corresponding body panel installed or removed from generator set. Door hinges on the generator set vary. Some doors have two hinges and some have only one. The doors with only one hinge also vary with respect to attaching hardware. The procedures provided in this WP are for a door with two hinges. Hinge removal, inspection, and install procedures are the same for each door with the exception of hinge mounting hardware quantities (WP 0034, Repair Door).

Each door is secured in closed position by a latch. Remove and install procedures are the same for all latches (WP 0034, Repair Door).

Each door has a door stay with locking link to hold the door in the open position. On doors with one hinge, the door stay is mounted at the top of the door. On doors with two hinges, the door stay is mounted at the bottom of the door. Mounting brackets for door stays are different depending on mounting location. Verify correct repair parts before beginning maintenance. Remove and install procedures are the same for all door stays (WP 0034, Repair Door).

1. Ensure equipment conditions are met in order presented in initial setup.

REMOVE/INSTALL DOOR – CONTINUED**Figure 2. Remove/Install Door.**

2. Open and support door (Figure 2, Item 3) to be removed.
3. Remove nut (Figure 2, Item 4) and two washers (Figure 2, Items 7 and 10) from hex shoulder bolt (Figure 2, Item 5) securing door stay (Figure 2, Item 11) to door stay bracket (Figure 2, Item 8).

NOTE

One of the four hinge screws (Figure 2, Item 13) and nuts (Figure 2, Item 4) also secures ground wire (Figure 2, Item 3) to door (Figure 2, Item 6).

4. Remove four screws (Figure 2, Item 13) and four nuts (Figure 2, Item 4) securing door (Figure 2, Item 6) to two hinges (Figure 2, Item 14) on unit body panel (Figure 2, Item 1). Discard lockwasher (Figure 2, Item 2) as required.
5. Remove door (Figure 2, Item 3), and place on a suitable work surface.

END OF TASK**Inspect Door**

1. Inspect door (Figure 2, Item 6) for excessive corrosion or obvious damage, and repair (WP 0034, Repair Door) or replace as required.
2. Inspect hinge(s) (Figure 2, Item 14) for freedom of movement and for excessive corrosion or obvious damage, and repair (WP 0034, Repair Door) or replace as required.
3. Inspect mounting hardware, door stay (Figure 2, Item 11), door stay bracket (Figure 2, Item 8), and body panel stay bracket (Figure 2, Item 12) for excessive corrosion or obvious damage, and repair (WP 0034, Repair Door) or replace as required.
4. Inspect door latch (not shown) for excessive corrosion or obvious damage, and repair (WP 0034, Repair Door) or replace as required.
5. Remove door stay bracket (Figure 2, Item 8) from door (Figure 2, Item 6) if door is being replaced. See Remove Door Stay and Brackets task.

REMOVE/INSTALL DOOR – CONTINUED

6. Remove body panel stay bracket (Figure 2, Item 12) from unit body panel (Figure 2, Item 1) if unit body panel (Figure 2, Item 1) or body panel stay bracket (Figure 2, Item 12) is being replaced. See Remove Door Stay and Brackets task.

END OF TASK**Install Door**

1. Position door (Figure 2, Item 6) to two hinges (Figure 2, Item 14), and align mounting holes.

NOTE

One of the four hinge screws (Figure 2, Item 13) and four nuts (Figure 2, Item 4) secures ground wire (Figure 2, Item 3) to door (Figure 2, Item 6).

2. Install four screws (Figure 2, Item 13) and four nuts (Figure 2, Item 4) and ground wire (Figure 2, Item 3) to secure door (Figure 2, Item 6) to two hinges (Figure 2, Item 14) on unit body panel (Figure 2, Item 1).
3. Install hex shoulder bolt (Figure 2, Item 5) and two washers (Figure 2, Items 7 and 10) through door stay (Figure 2, Item 11) and door stay bracket (Figure 2, Item 8), and secure with nut (Figure 2, Item 9).
4. Verify proper operation of door (Figure 2, Item 6), hinges (Figure 2, Item 14), door latch (not shown), and door stay (Figure 2, Item 11).
5. Repair as required.

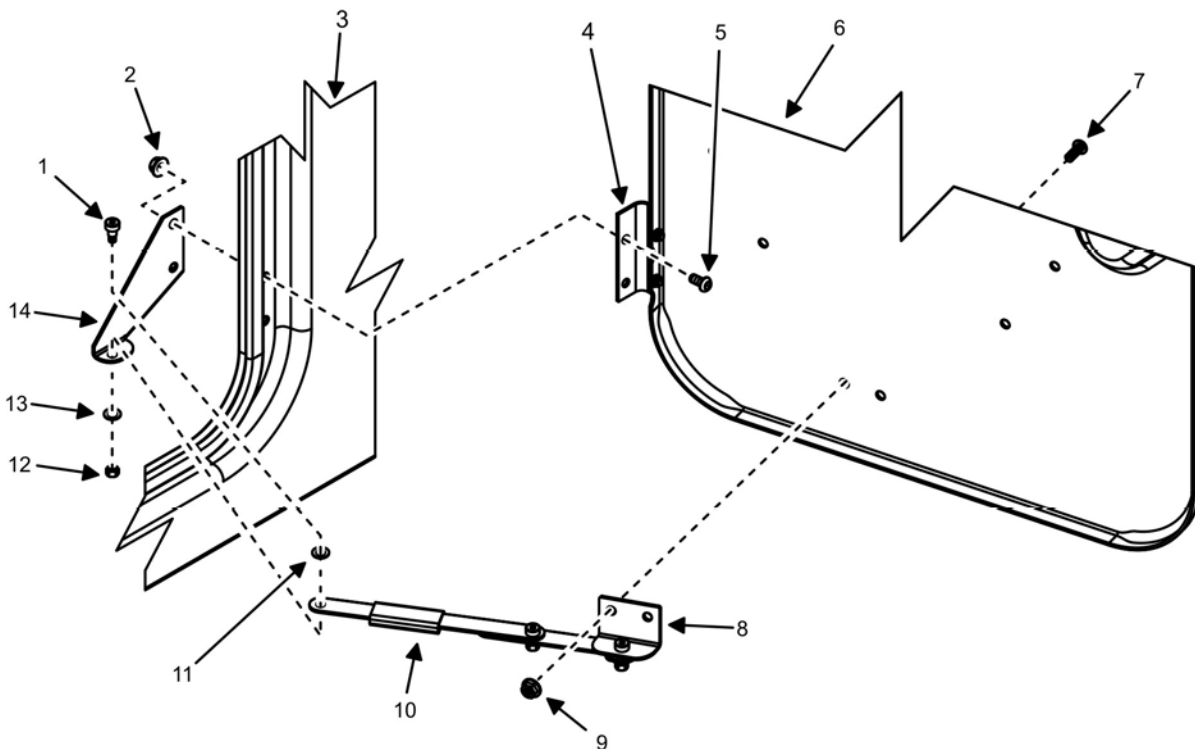
END OF TASK**Remove Door Stay and Brackets**

Figure 3. Door Stay, Bracket, and Hinge - Detail.

REMOVE/INSTALL DOOR – CONTINUED

1. Remove hex head shoulder bolt (Figure 3, Item 1), two washers (Figure 3, Items 11 and 13), and nut (Figure 3, Item 12), and remove door stay (Figure 3, Item 10) from body panel stay bracket (Figure 3, Item 14).
2. Remove two hex socket head screws (Figure 3, Item 5) and two nuts (Figure 3, Item 2) to separate hinge (Figure 3, Item 4) and body panel stay bracket (Figure 3, Item 14) from unit body panel (Figure 3, Item 3).
3. Remove remaining hinge (not shown) by removing two hex socket head screws (Figure 3, Item 5) and two nuts (Figure 3, Item 2), and separate hinge (not shown) from unit body panel (Figure 3, Item 3).
4. Remove two hex socket head screws (Figure 3, Item 7) and nuts (Figure 3, Item 9) securing door stay bracket (Figure 3, Item 8) to inside of door (Figure 3, Item 6).
5. Place hinge(s) (Figure 3, Item 4), door stay (Figure 3, Item 10), door stay bracket (Figure 3, Item 8), body panel bracket (Figure 3, Item 14), and all mounting hardware on a suitable work surface.

END OF TASK**Inspect Door Stay and Brackets**

1. Inspect door stay (Figure 3, Item 10), door stay bracket (Figure 3, Item 8), body panel bracket (Figure 3, Item 14), and mounting hardware for damage or corrosion.
2. Inspect hinge(s) (Figure 3, Item 4) for freedom of movement, damage, or corrosion, and repair (WP 0034, Repair Door) or replace as required.
3. Repair or replace damaged, broken, or excessively corroded hardware.

END OF TASK**Install Door Stay and Brackets****NOTE**

Doors with only one hinge have the door stay mounted at the top. Doors with two hinges have the door stay mounted at the bottom.

1. Position body panel stay bracket (Figure 3, Item 14) and hinge (Figure 3, Item 4) onto unit body panel (Figure 3), and align mounting holes.
2. Install two hex socket head screws (Figure 3, Item 5) and two nuts (Figure 3, Item 2) securing body panel stay bracket (Figure 3, Item 14) and hinge (Figure 3, Item 4) to unit body panel (Figure 3, Item 3).
3. Position door stay bracket (Figure 3, Item 8) onto door (Figure 3, Item 6), and align mounting holes. Ensure proper orientation of door stay bracket (Figure 3, Item 8).
4. Install hex socket head screws (Figure 3, Item 7) through door (Figure 3, Item 6) and door stay bracket (Figure 3, Item 8), and secure with two nuts (Figure 3, Item 9).
5. Install hex head shoulder bolt (Figure 3, Item 1), two washers (Figure 3, Items 11 and 13), and nut (Figure 3, Item 12) to secure door stay (Figure 3, Item 10) to body panel stay bracket (Figure 3, Item 14).
6. Verify proper operation of door (Figure 3, Item 6), hinges (Figure 3, Item 4), and door stay (Figure 3, Item 10) by opening and closing door (Figure 3, Item 6) and using door stay (Figure 3, Item 10) to hold door (Figure 3, Item 6) in open position.
7. Repair as required.
8. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
9. Close all unit doors.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**REPAIR DOOR**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
Wrench, Torque, Click, Ratcheting, 3/8 in Drive, 75 ft•lb (WP 0162, Table 2, Item 41)

Personnel Required

91D (1)

References

WP 0033, Remove/Install Door

Materials/Parts

Hinge (WP 0102, Item 36)
Hinge (WP 0102, Item 61)
Latch (WP 0102, Item 39)
Grease, electrically conductive (WP 0163, Table 1, Item 20)

Equipment Condition

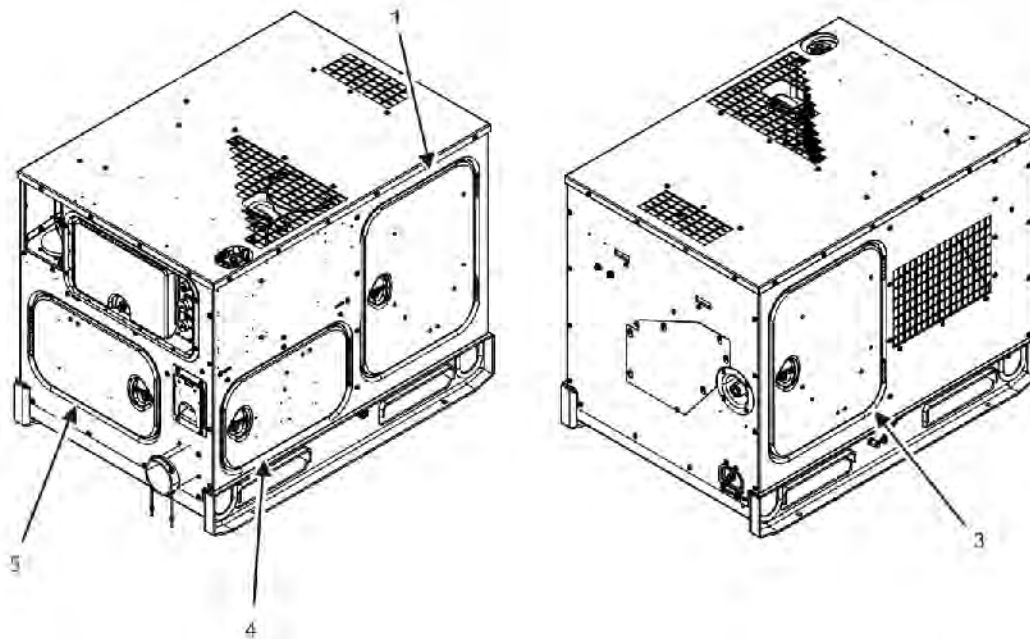
Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)

REPAIR DOOR**WARNING**

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

NOTE

Four doors (Figure 1, Items 1 through 4) are installed on the generator set. Repair of doors is accomplished by replacement of door latch and/or hinges. Door latches and hinges can be replaced with panel installed on the unit or with panel removed. Except for the number of screws and size of hinges, basic replacement procedures for the door latch and hinges are the same for all doors. Procedures are also the same whether unit panel is installed or removed from unit.

REPAIR DOOR – CONTINUED**Remove Latch**Legend

- 1 Right-side Door
- 2 Left-side Door

3 Output Box Door

4 Rear Panel Door

Figure 1. Door Repair - Locations.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate door to be repaired (Figure 1).

REPAIR DOOR – CONTINUED

3.

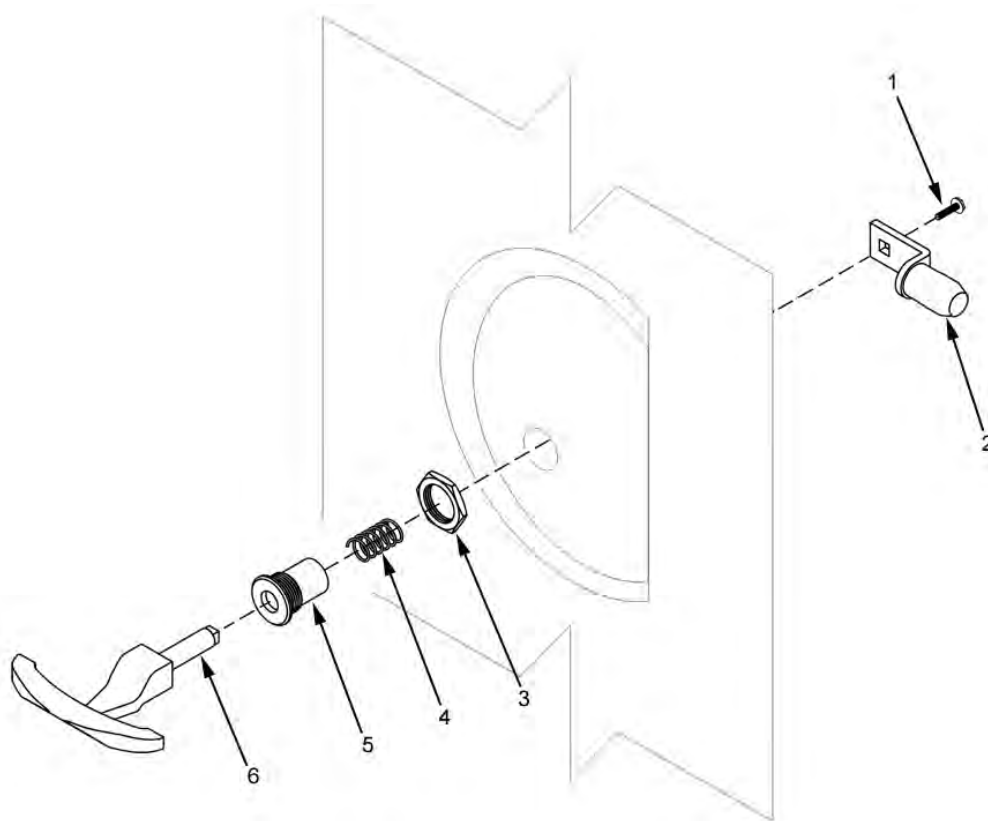


Figure 2. Door Latch Components.

NOTE

Separating the inner latch and outer latch components releases a spring. Ensure this spring is not lost during disassembly.

Remove bolt (Figure 2, Item 1) securing inner door latch (Figure 2, Item 2) to handle (Figure 2, Item 6) and place bolt (Figure 2, Item 1) on a suitable work surface.

4. Disconnect inner door latch (Figure 2, Item 2) from rear of door and place on a suitable work surface.
5. Remove handle (Figure 2, Item 6), outer latch body (Figure 2, Item 5) and nut (Figure 2, Item 3) from front of door by pulling back and out. Place latch parts and spring (Figure 2, Item 4) on a suitable work surface.
6. Remove nut (Figure 2, Item 3) from outer latch body (Figure 2, Item 5) as required.
7. Inspect all door latch parts for corrosion or other damage, and replace as required.

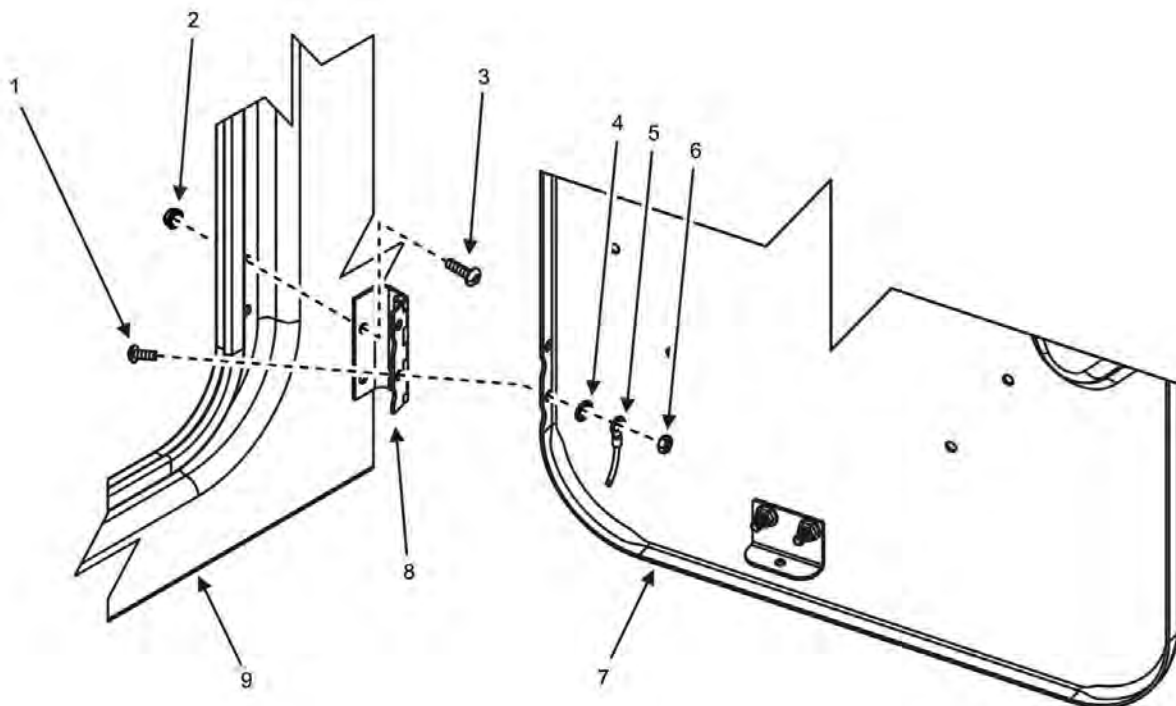
END OF TASK**Install Latch****NOTE**

Door latches on left- and right-side access doors include a washer (Figure 2, Item 4) on the latch pivot mounting (Figure 2, Item 5).

1. Install nut (Figure 2, Item 4) to latch pivot mounting (Figure 2, Item 5) as required.
2. Install spring (Figure 2, Item 3) inside outer latch pivot mounting (Figure 2, Item 5).

REPAIR DOOR – CONTINUED

3. Position inner latch (Figure 2, Item 2) and outer latch (Figure 2, Items 5 and 6) parts to their mounting locations on either side of door.
4. Secure inner latch (Figure 2, Item 2) and outer latch (Figure 2, Items 5 and 6) to door by installing bolt (Figure 2, Item 1).
5. Check door latch for proper operation.
6. Install battery ground cable (WP 0036, Remove/Install Batteries).

END OF TASK**Remove Hinge****Figure 3. Door Hinge Components.****NOTE**

Doors (Figure 3, Item 7) are attached to mounting locations by either a single hinge or two hinges. For doors with two hinges, one hinge can be replaced without removing the door from the unit. Remove and install procedures are the same for all hinges.

For hinges (Figure 3, Item 8) with door stay brackets attached, release bracket from hinge mounting location, but leave opposite end of door stay fastened to door when possible.

NOTE

Screws (Figure 3, Item 1) and nuts (Figure 3, Item 6) securing hinge (Figure 3, Item 8) to door (Figure 3, Item 7) may also secure ground wire(s) (Figure 3, Item 5) and lock-washer (Figure 3, Item 4).

1. Open door (Figure 3, Item 7) with hinge(s) (Figure 3, Item 8) to be removed.

REPAIR DOOR – CONTINUED

2. Remove screws (Figure 3, Item 1) and nuts (Figure 3, Item 6) securing hinge (Figure 3, Item 8) to door (Figure 3, Item 7).
3. Discard lockwasher (Figure 3, Item 4) as required.
4. Remove screws (Figure 3, Item 3) and nuts (Figure 3, Item 2) securing hinge (Figure 3, Item 8) to body panel (Figure 3, Item 9).
5. Remove hinge (Figure 3, Item 8) and door (Figure 3, Item 7) from unit, and place on a suitable work surface.
6. Inspect all door and hinge parts for corrosion or other damage, and replace as required.

END OF TASK**Install Hinge****NOTE**

If the hinge (Figure 3, Item 8) being replaced is also the mounting location for a door stay bracket (not shown), align the bracket mounting holes with the hinge mounting holes when installing the hinge.

1. Position hinge (Figure 3, Item 8) to its mounting location on door (Figure 3, Item 7) and align mounting holes.
2. Install hinge (Figure 3, Item 8) to door (Figure 3, Item 7) using screws (Figure 3, Item 1) and nuts (Figure 3, Item 6). Finger tighten.
3. Position door stay bracket (not shown), if needed, by aligning bracket mounting holes with mounting holes in hinge (Figure 3, Item 8) and in body panel (Figure 3, Item 9).
4. Install hinge (Figure 3, Item 8) and door stay bracket (WP 0033, Remove/Install Door) to body panel (Figure 3, Item 9) using screws (Figure 3, Item 3) and nuts (Figure 3, Item 2). Finger-tighten.
5. Secure all hinge screws (Figure 3, Items 1 and 3). Torque screws to 8 ft•lb (10-12 N•m).
6. Verify proper hinge operation by opening and closing door and repair as needed.
7. Verify proper door stay operation. Repair or replace as required (WP 0033, Remove/Install Door).
8. Repeat Replace Door Hinge task as needed for other hinges.
9. Install battery ground cable (WP 0036, Remove/Install Batteries).
10. Close all generator set doors.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
REMOVE/INSTALL INTERIOR BODY PANELS

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

References

WP 0020, Air Cleaner Assembly
 WP 0027, Remove/Install Radiator
 WP 0081, Remove/Install Muffler

Materials/Parts

Crossmember, enclosure (WP 0102, Item 80)
 Duct, air, fan (WP 0102, Item 76)
 Panel, radiator (WP 0102, Item 79)
 Panel, support (WP 0102, Item 77)
 Antifreeze, ethylene glycol (WP 0163, Table 1, Item 2)
 Cap set, protective (WP 0163, Table 1, Item 8)
 Grease, electrically conductive (WP 0163, Table 1, Item 20)
 Pan, drain (WP 0163, Table 1, Item 28)
 Rag, wiping (WP 0163, Table 1, Item 31)
 Tag, marker (WP 0163, Table 1, Item 35)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool
 Battery ground cable removed (WP 0036, Remove/Install Batteries)
 Top body panel removed (WP 0028, Remove/Install Top Body Panel)
 Right-side body panel removed (WP 0032, Remove/Install Right-side Body Panel)
 Left-side body panel removed (WP 0031, Remove/Install Left-side Body Panel)
 Rear body panel removed (WP 0030, Remove/Install Rear Body Panel)
 Coolant bottle removed (WP 0022, Remove/Install Coolant Recovery System)
 Cooling fan removed (WP 0023, Remove/Install Cooling Fan)

Personnel Required

91D (1)
 Assistant (1)

REMOVE/INSTALL INTERIOR PANELS
NOTE

Interior panels (Figure 1) must be removed in sequence as written in this document.

Remove Fuel System and Fan Support Panels

1. Ensure equipment conditions are met in order presented in initial setup.

REMOVE/INSTALL INTERIOR PANELS – CONTINUED

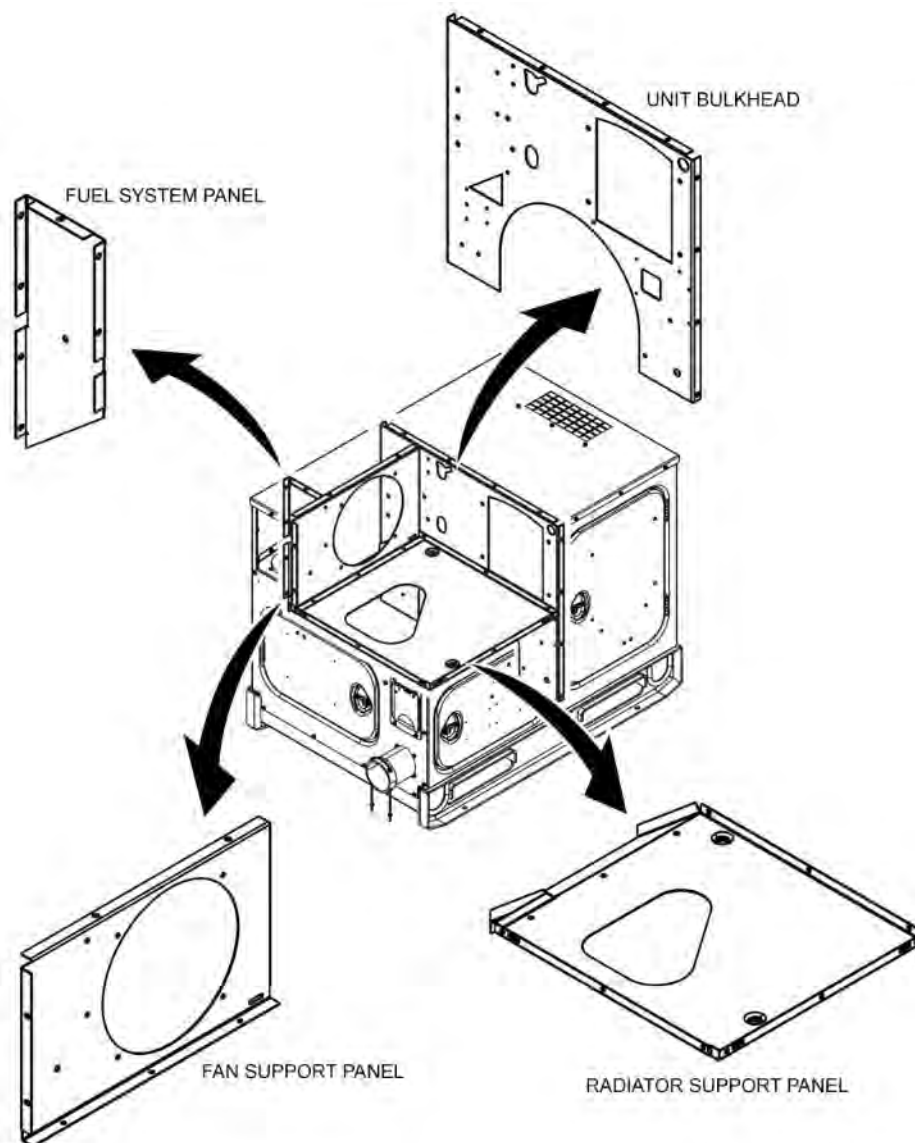
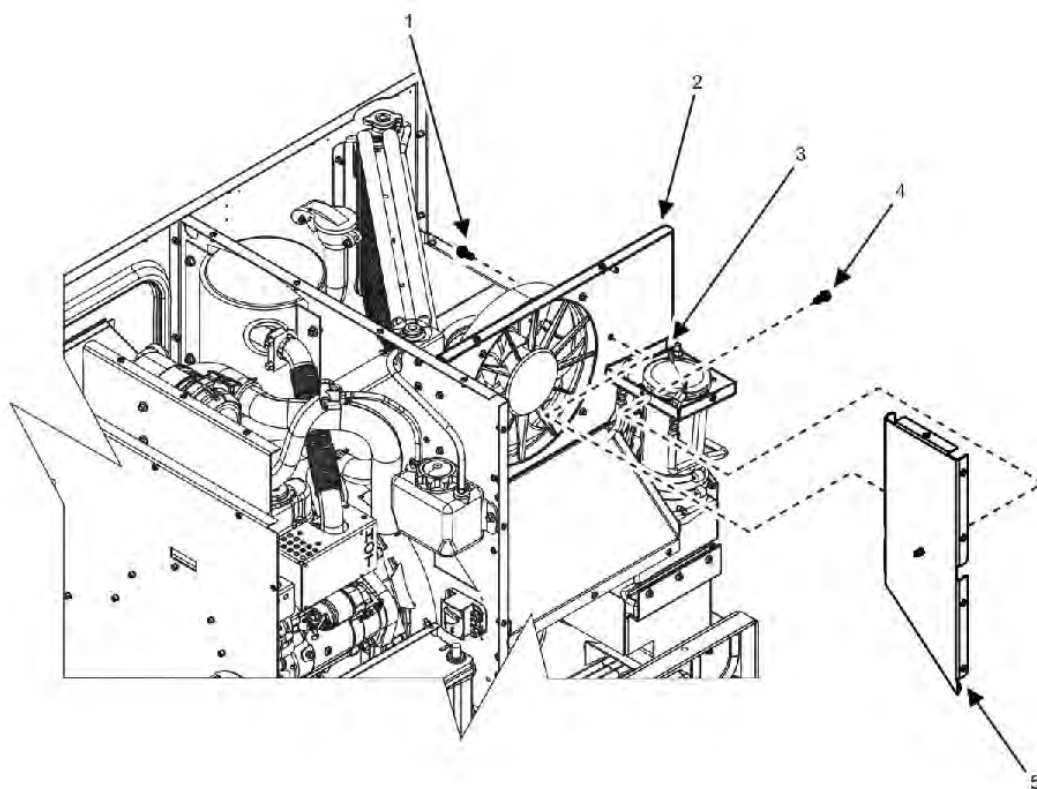


Figure 1. Interior Panel - Locations.

REMOVE/INSTALL INTERIOR PANELS – CONTINUED

**Figure 2. Fuel Neck Panel.**

2. Remove two screws (Figure 2, Item 1) securing fan support panel (Figure 2, Item 2) to edge of fuel system panel (Figure 2, Item 5).
3. Remove one screw (Figure 2, Item 4) securing fuel filler neck bracket (Figure 2, Item 3) to center of fuel system panel (Figure 2, Item 5).

NOTE

Screw (Figure 2, Item 4) is located between fuel filler neck bracket (Figure 2, Item 3) and fuel filler and is difficult to access.

4. Remove fuel system panel (Figure 2, Item 5) from unit, and inspect for damage. Replace fuel system panel (Figure 2, Item 5) as required.
5. Remove two screws (Figure 3, Item 5) securing fan support panel (Figure 3, Item 3) to unit bulkhead (Figure 3, Item 1).
6. Remove three screws (Figure 3, Item 2) securing fan support panel (Figure 3, Item 3) to radiator support panel (Figure 3, Item 4).
7. Remove fan support panel (Figure 3, Item 3) from unit, and place on suitable work surface.
8. Inspect fan support panel (Figure 3, Item 3) for damage or corrosion. Replace fan support panel (Figure 3, Item 3) as required.

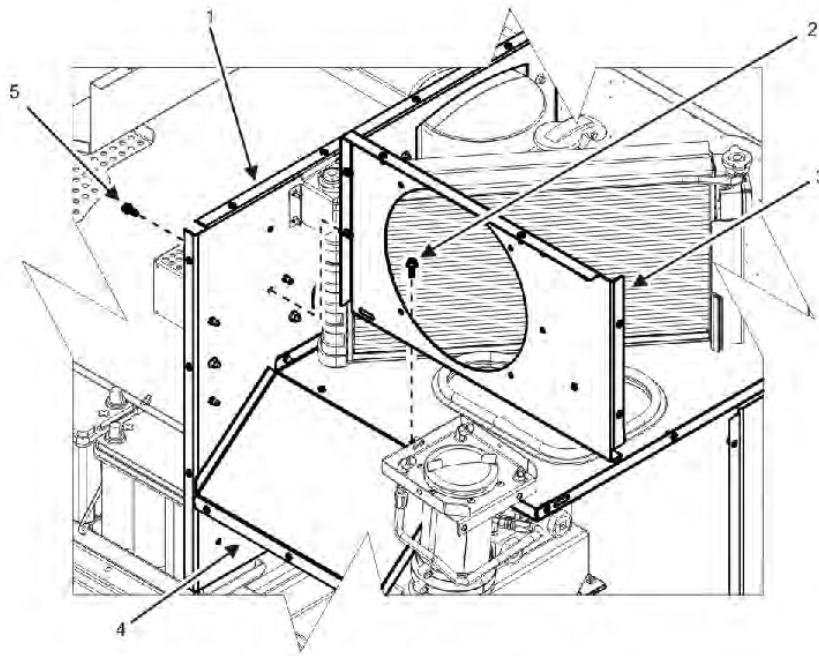
REMOVE/INSTALL INTERIOR PANELS – CONTINUED

Figure 3. Remove Fan Support Panel.

9. Repair minor damage or corrosion, or replace fan support panel (Figure 3, Item 3) as required.

END OF TASK**Install Fan Support Panel**

1. Position fan support panel (Figure 3, Item 3) in unit, ensuring proper orientation.

NOTE

Brace the fan support panel (Figure 3, Item 3) while installing screws securing fan support panel (Figure 3, Item 3) to unit bulkhead (Figure 3, Item 1) and radiator support panel (Figure 3, Item 4).

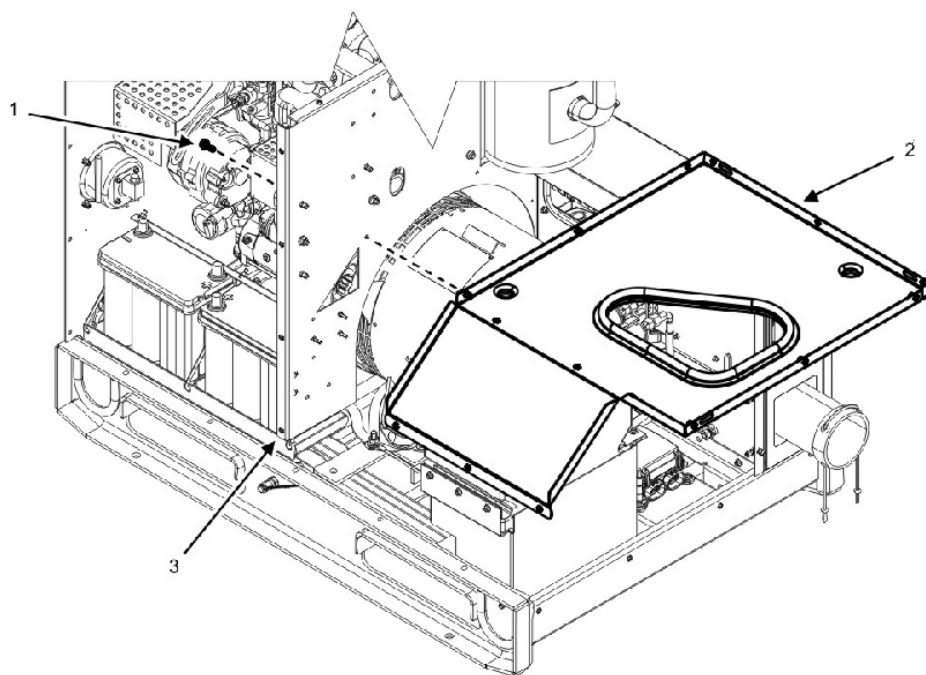
2. Secure fan support panel (Figure 3, Item 3) to unit bulkhead (Figure 3, Item 1) by installing two screws (Figure 3, Item 5) finger-tight.
3. Secure fan support panel (Figure 3, Item 3) to radiator support panel (Figure 3, Item 4) by installing three screws (Figure 3, Item 2) finger-tight.
4. Position fuel system panel (Figure 2, Item 5) to fan support panel (Figure 2, Item 2), and secure by installing two screws (Figure 2, Item 1) finger-tight.
5. Secure fuel system panel (Figure 2, Item 5) to fuel filler neck bracket (Figure 2, Item 3) by installing one screw (Figure 2, Item 4) finger-tight.
6. Tighten all screws installed in Steps 2 through 5.
7. Install cooling fan (WP 0023, Remove/Install Cooling Fan).
8. Install rear body panel (WP 0030, Remove/Install Rear Body Panel).
9. Install left-side body panel (WP 0031, Remove/Install Left-Side Body Panel).

REMOVE/INSTALL INTERIOR PANELS – CONTINUED

10. Install top body panel (WP 0028, Remove/Install Top Body Panel).
11. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
12. Close generator set doors.
13. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
14. Start engine, and check for proper operation (TM 9-6115-749-10).
15. Repair as required.

END OF TASK**Remove Radiator Support Panel**

1. Ensure equipment conditions are met in order presented in initial setup.
2. Remove fuel system and fan support panels. See Remove Fuel System and Fan Support Panels task.
3. Remove radiator (WP 0027, Remove/Install Radiator).

**Figure 4. Remove Radiator Support Panel.**

4. Remove right-side body panel (WP 0032, Remove/Install Right-Side Body Panel).

NOTE

Support the radiator support panel (Figure 4, Item 2) while removing screws (Figure 4, Item 1) from unit bulkhead (Figure 4, Item 3).

5. Remove three screws (Figure 4, Item 1) securing radiator support panel (Figure 4, Item 2) to unit bulkhead (Figure 4, Item 3).
6. Remove radiator support panel (Figure 4, Item 2) from unit, and place on suitable work surface.

REMOVE/INSTALL INTERIOR PANELS – CONTINUED

7. Inspect radiator support panel (Figure 4, Item 2) for damage or excessive corrosion. Replace radiator support panel (Figure 4, Item 2) as required.
8. Repair minor damage and corrosion, or replace radiator support panel (Figure 4, Item 2) as required.

END OF TASK**Install Radiator Support Panel**

1. Position radiator support panel (Figure 4, Item 2) to mounting location in unit.

NOTE

Support the radiator support panel (Figure 4, Item 2) while installing screws (Figure 4, Item 1) to unit bulkhead (Figure 4, Item 3).

2. Secure radiator support panel (Figure 4, Item 2) to unit bulkhead (Figure 4, Item 3) by installing three screws (Figure 4, Item 1) finger-tight.

NOTE

Step 3 will have been completed if unit bulkhead (Figure 6, Item 6) has been removed and reinstalled.

3. Install right-side body panel (WP 0032, Remove/Install Right-Side Body Panel).
4. Tighten screws installed in Step 2.
5. Install the radiator (WP 0027, Remove/Install Radiator).
6. Install fuel system and fan support panels. See Install Fan Support Panel task.

END OF TASK**Remove Unit Bulkhead**

1. Ensure equipment conditions are met in order presented in initial setup.
2. Remove radiator support panel. See Remove Radiator Support Panel task.

CAUTION

Since both side body panels have been removed, the unit bulkhead (Figure 6, Item 6) has only minimal support. Proceed with unit bulkhead (Figure 6, Item 6) removal carefully. Failure to comply may cause damage to equipment.

3. Remove the air cleaner and hose assembly (WP 0020, Service Air Cleaner).
4. Remove the muffler (WP 0081, Remove/Install Muffler).
5. Remove three screws (Figure 5, Item 4) and three nuts (Figure 5, Item 3) securing main DC circuit breaker (Figure 5, Item 1) to engine side of unit bulkhead (Figure 5, Item 2).
6. Tag all electrical leads of main DC circuit breaker (Figure 5, Item 1).
7. Remove main DC circuit breaker (Figure 5, Item 1) from unit bulkhead (Figure 5, Item 2).

REMOVE/INSTALL INTERIOR PANELS – CONTINUED

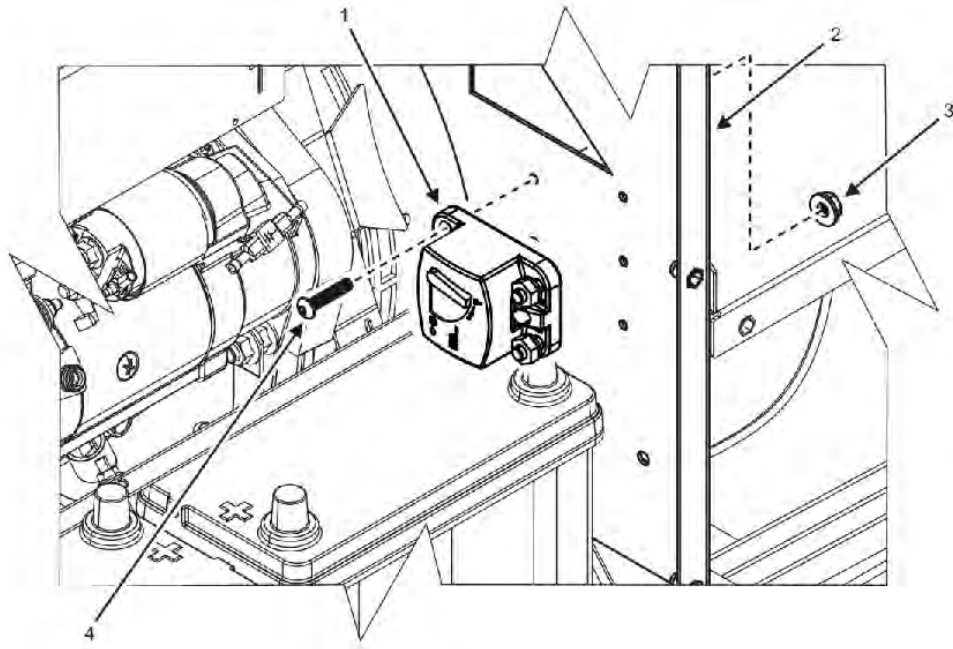


Figure 5. Main Breaker.

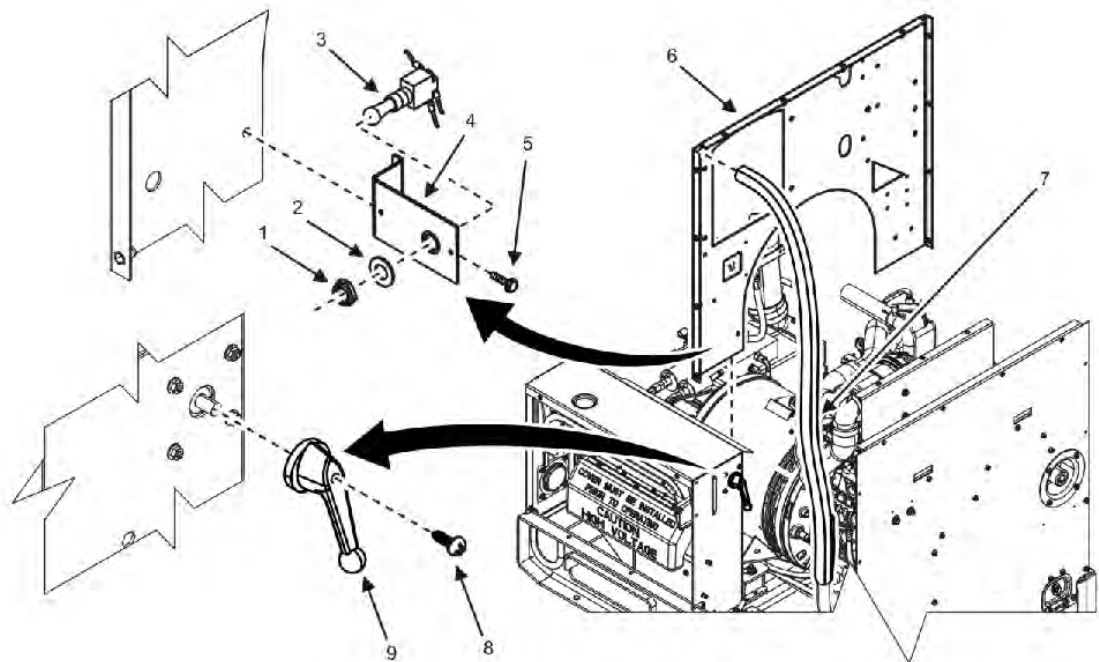


Figure 6. Remove Bulkhead.

8. Remove winterization kit exhaust tube (Figure 6, Item 7), if installed, from opening in top of unit bulkhead (Figure 6, Item 6).

REMOVE/INSTALL INTERIOR PANELS – CONTINUED

9. Remove screw (Figure 6, Item 8) securing voltage selection switch handle (Figure 6, Item 9), and remove handle (Figure 6, Item 9) from unit.
10. Remove nut (Figure 6, Item 1), threaded collar (Figure 6, Item 2), and DEAD CRANK SWITCH (Figure 6, Item 3) from bracket (Figure 6, Item 4). Re-position DEAD CRANK SWITCH (Figure 6, Item 3) away from unit bulkhead (Figure 6, Item 6).
11. Remove screw (Figure 6, Item 5) and bracket (Figure 6, Item 4) from unit bulkhead (Figure 6, Item 6).
12. Remove unit bulkhead (Figure 6, Item 6) from unit, and place on suitable work surface.
13. Inspect unit bulkhead (Figure 6, Item 6) for damage or excessive corrosion. Replace unit bulkhead (Figure 6, Item 6) as required.
14. Repair minor damage or corrosion, or replace unit bulkhead (Figure 6, Item 6) as required.

END OF TASK**Install Unit Bulkhead**

1. Position unit bulkhead (Figure 6, Item 6) to unit skid, and ensure proper orientation.
2. Position bracket (Figure 6, Item 4) to unit bulkhead (Figure 6, Item 6), and secure by installing screw (Figure 6, Item 5).
3. Position DEAD CRANK SWITCH (Figure 6, Item 3) to its mounting position in bracket (Figure 6, Item 4), and secure by installing threaded collar (Figure 6, Item 2) and nut (Figure 6, Item 1).
4. Position handle (Figure 6, Item 9) to its mounting position, and secure by installing screw (Figure 6, Item 8).
5. Position winterization kit exhaust tube (Figure 6, Item 7), if previously removed, to its mounting position at top of unit bulkhead (Figure 6, Item 6).
6. Position voltage selection switch shaft through unit bulkhead (Figure 6, Item 6), and install handle (Figure 6, Item 9).
7. Install right-side body panel (WP 0032, Remove/Install Right-Side Body Panel).
8. Install muffler (WP 0081, Remove/Install Muffler).
9. Install coolant bottle (WP 0022, Remove/Install Coolant Recovery System).
10. Install air cleaner and hose assembly (WP 0020, Service Air Cleaner).
11. If installed, place winterization kit exhaust tube (Figure 6, Item 7) through opening in unit bulkhead (Figure 6, Item 6).
12. Position main DC circuit breaker (Figure 5, Item 1) on engine side of unit bulkhead (Figure 5, Item 2), and align mounting holes.
13. Install three screws (Figure 5, Item 4) and three nuts (Figure 5, Item 3) to secure main DC circuit breaker (Figure 5, Item 1) to left-side of unit bulkhead (Figure 5, Item 2).
14. Install radiator support panel. See Remove Radiator Support Panel task.

END OF TASK**END OF TASK****END OF WORK PACKAGE**

FIELD MAINTENANCE
REMOVE/INSTALL BATTERIES

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162,
Table 2, Item 33)

Personnel Required

91D (1)
Assistant (1)

Materials/Parts

Battery, storage (2) (WP 0100, Item 6)
Brush, battery terminal (WP 0163, Table 1, Item
6)
Grease, electrically conductive (WP 0163, Table
1, Item 20)
Rag, wiping (WP 0163, Table 1, Item 31)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP
0005)
Engine cool

REMOVE/INSTALL BATTERIES**WARNING**

Do not damage batteries. Storage batteries are filled with a liquid acid that can leak from sealed battery when case is broken. Contact with acidic liquid can burn skin and eyes. Wear safety goggles and chemical gloves and avoid acid splash while handling damaged batteries. Do not move batteries by terminals. Failure to comply may cause injury or death to personnel or damage to equipment.

WARNING

Lifting batteries may cause back strain. Ensure proper lifting techniques are used when lifting batteries. Failure to comply may cause injury or death to personnel.

WARNING

The right-hand battery negative lead that connects directly to the grounding stud must be disconnected prior to disconnecting or removing batteries. Follow procedural steps in exact order given for removal and installation. Failure to comply may cause injury or death to personnel.

WARNING

Metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry and do not wear loose clothing when working on equipment. Failure to comply may cause injury or death to personnel.

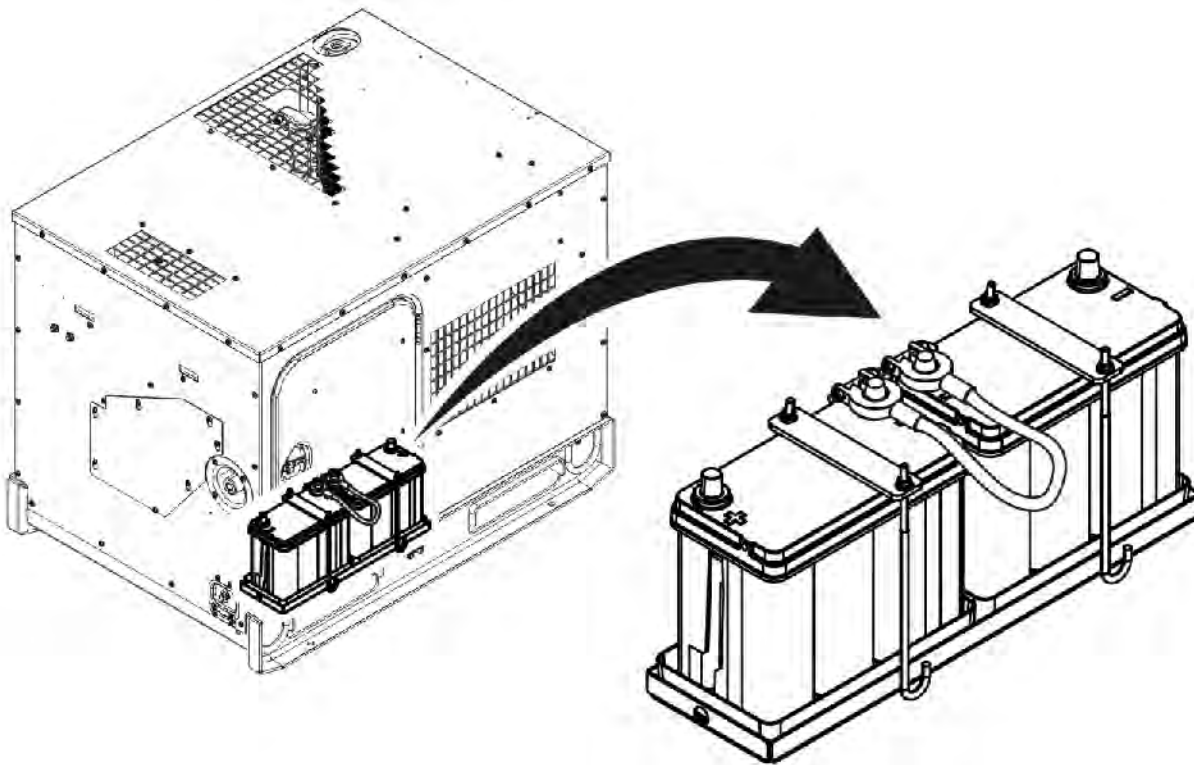
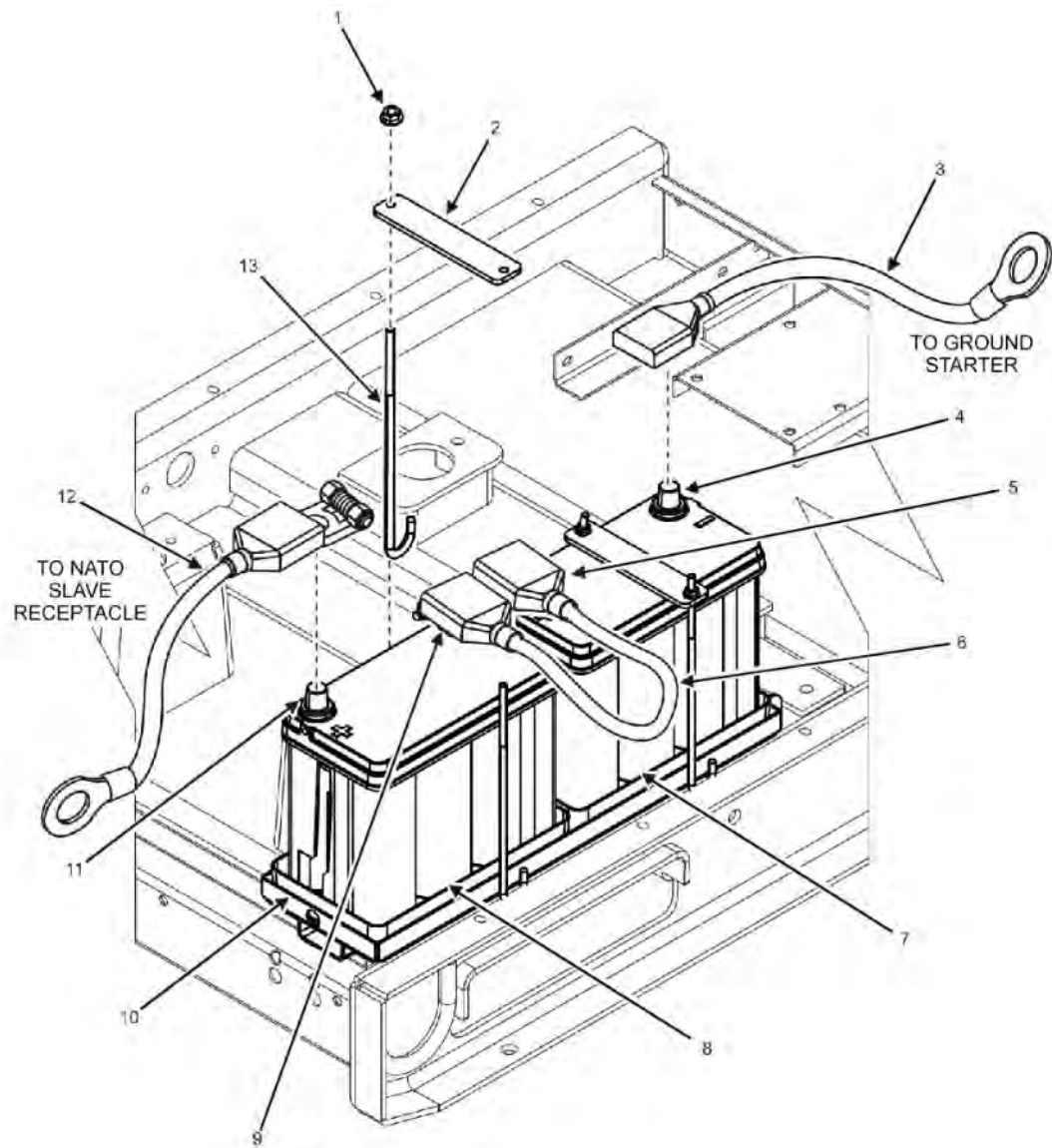
REMOVE/INSTALL BATTERIES – CONTINUED**Remove Batteries**

Figure 1. Battery - Location.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Open left-side door of generator set to locate batteries (Figure 1).

REMOVE/INSTALL BATTERIES – CONTINUED

**Figure 2. Remove/Install Batteries.**

3. Disconnect battery unit ground cable (Figure 2, Item 3) from negative battery terminal (Figure 2, Item 4) of right-hand battery (Figure 2, Item 7).
4. Disconnect battery jumper cable (Figure 2, Item 6) from negative battery terminal (Figure 2, Item 9) of left-hand battery (Figure 2, Item 8).

REMOVE/INSTALL BATTERIES – CONTINUED**NOTE**

Sealed lead acid batteries do not leak in normal usage. The battery can be moved out of the tray and tilted to allow movement of left-hand battery (Figure 2, Item 8) for ease of terminal removal.

5. Disconnect battery unit power cable (Figure 2, Item 12) from positive battery terminal (Figure 2, Item 11) of left-hand battery (Figure 2, Item 8).
6. Disconnect battery jumper cable (Figure 2, Item 6) from positive battery terminal (Figure 2, Item 5) of right-hand battery (Figure 2, Item 7).
7. Remove battery jumper cable (Figure 2, Item 6) from unit.
8. Inspect battery jumper cable (Figure 2, Item 6) for frayed edges, cracked insulation, and other obvious signs of damage. Replace as required.
9. Loosen and remove four nuts (Figure 2, Item 1) from four J-hooks (Figure 2, Item 13) securing two battery holders (Figure 2, Item 2) to unit.
10. Remove two battery holders (Figure 2, Item 2) from unit.
11. Inspect battery holders (Figure 2, Item 2) for corrosion, excessive wear, and other signs of obvious damage. Replace battery holders (Figure 2, Item 2) as required.

CAUTION

Do not move or lift batteries by the terminal studs. Lift batteries using battery lifting strap if supplied with battery. Failure to comply will cause damage to equipment.

12. Lift and remove two batteries (Figure 2, Items 7 and 8) from unit.
13. Lift and remove two removable battery trays (Figure 2, Item 10) from unit.

WARNING

Eye protection is required when working with compressed air. Do not use compressed air to clean skin. Do not aim at personnel. Compressed air can propel particles at high velocity and injure eyes. Failure to comply may cause injury or death to personnel.

14. Clean dirt and debris from removable battery trays (Figure 2, Item 10) with compressed air and wiping rag.
15. Inspect removable battery trays (Figure 2, Item 10) for corrosion, dents, and other signs of obvious damage. Replace as required.
16. Remove four J-hooks (Figure 2, Item 13) from unit.
17. Inspect J-hooks (Figure 2, Item 13) for corrosion, excessive wear, and other signs of obvious damage. Replace as required.
18. Clean dirt and debris from battery compartment with wiping rag.

END OF TASK**Test/Inspect Batteries**

1. Inspect batteries (Figure 2, Items 7 and 8) for leaks, cracks, swelling, and corrosion. Replace batteries (Figure 2, Items 7 and 8) as required.
2. Inspect battery terminals (Figure 2, Items 4, 5, 9 and 11) for melting, bends, or other damage. Replace batteries (Figure 2, Items 7 and 8) as required.
3. Ensure equipment conditions are met in order presented in initial setup.
4. Remove dirt and debris from all battery terminals (Figure 2, Items 4, 5, 9, and 11) with battery terminal brush.

REMOVE/INSTALL BATTERIES – CONTINUED**NOTE**

The DCS provides a constant, real-time monitor of battery voltage and current.

5. With a multimeter set to test VDC, test voltage of each battery (Figure 2, Items 7 and 8).

WARNING

Batteries give off combustible gas. Do not smoke or use open flame when performing maintenance. Failure to comply may cause injury or death to personnel and damage to equipment.

CAUTION

When recharging batteries (Figure 2, Items 7 and 8) always use a voltage regulated battery charger, and strictly adhere to all limits in Table 1. When first turning on a charger, always watch the ammeter for the first few minutes to verify that each battery (Figure 2, Items 7 and 8) is accepting amperage. Batteries (Figure 2, Items 7 and 8) will get slightly warm during charging. Any battery (Figure 2, Items 7 and 8) that is hot to the touch indicates a malfunction and charging must be stopped immediately. Failure to comply will cause damage to equipment.

NOTE

A completely discharged battery is considered to have 11.2 VDC or less. A deeply discharged battery (10.5 VDC or less) may not accept a charge from a charger. A deeply discharged battery may need to be charged while in parallel with another fully charged 12 VDC automotive battery until deeply discharged battery reaches 10.5 VDC or above. Once deeply discharged battery reaches 10.5 VDC, normal charging procedures can be followed.

6. Charge any battery (Figure 2, Items 7 and 8) with voltage reading less than 12 VDC (Table 1).

Table 1. Charging Recommendations.

CHARGER TYPE	TARGET VOLTAGE RANGE (VDC)	MAXIMUM CURRENT (AMPS)
Regular/Automatic	13.8 to 15.0	10
Float Charge	13.2 to 13.8	1
Constant Voltage Charger	15.6 maximum	No limit as long as battery temperature remains below 125 °F (51.7 °C)

NOTE

After charging, allow each charged battery (Figure 2, Items 7 and 8) to settle ("rest") for a minimum of 8 hours. Batteries (Figure 2, Items 7 and 8) should have approximately 12.85 VDC open circuit voltage after charging and settling period.

7. Use a multimeter set to test VDC, and check each settled ("rested") battery (Figure 2, Items 7 and 8) for proper voltage.
8. Use battery (Figure 2, Items 7 and 8) if within specification, or attempt recharge, and replace battery (Figure 2, Items 7 and 8) if discharge continues after one additional charging attempt.
9. Ensure batteries are connected. See Install Batteries task.

REMOVE/INSTALL BATTERIES – CONTINUED**NOTE**

Use of an assistant is required to load test batteries. Batteries should hold proper voltage during a load test of 15 sec.

10. Use a multimeter set to test VDC to measure the voltage of each battery while an assistant positions DEAD CRANK SWITCH in CRANK position for 15 sec (TM 9-6115-749-10).
11. Follow charge procedures (Steps 6 through 8) for any battery (Figure 2, Items 7 and 8) that drops below 10 VDC during load test.

END OF TASK**Install Batteries**

1. Insert four J-hooks (Figure 2, Item 13) through openings in battery compartment permanent tray (not shown) beneath removable battery trays (Figure 2, Item 10).

NOTE

Place battery (Figure 2, Items 7 and 8) and removable battery tray (Figure 2, Item 10) in center of permanent tray for ease of installation. Battery and removable battery tray (Figure 2, Item 10) may be placed in position after attaching unit power cable.

2. Place two battery trays (Figure 2, Item 10) into mounting position in unit.

CAUTION

Do not move or lift batteries by the terminal studs. Lift batteries using battery lifting strap if supplied with battery. Failure to comply will cause damage to equipment.

3. Position left-hand battery (Figure 2, Item 8) in removable battery tray (Figure 2, Item 10) with positive battery terminal (Figure 2, Item 11) facing to the left.
4. Position battery holder (Figure 2, Item 2) across top-center of battery, and align holes with two J-hooks (Figure 2, Item 13).
5. Install one nut (Figure 2, Item 1) to each J-hook (Figure 2, Item 13), and hand-tighten both nuts (Figure 2, Item 1).
6. Install right-hand battery (Figure 2, Item 7) using Steps 3 through 5.
7. Apply a light coating of electrically conductive grease to all battery terminals (Figure 2, Items 4, 5, 9, and 11).
8. Attach battery unit power cable (Figure 2, Item 12) to positive battery terminal (Figure 2, Item 11) of left-hand battery (Figure 2, Item 8).
9. Attach battery jumper cable (Figure 2, Item 6) to positive battery terminal (Figure 2, Item 5) of right-hand battery (Figure 2, Item 7).
10. Attach battery jumper cable (Figure 2, Item 6) to negative battery terminal (Figure 2, Item 9) of left-hand battery (Figure 2, Item 8).
11. Adjust position of two battery holders (Figure 2, Item 2) to secure batteries (Figure 2, Items 7 and 8) in position.

CAUTION

Excessive tightening of the battery holder (Figure 2, Item 2) may crack the battery case. Do not over-tighten nuts (Figure 2, Item 1) on J-hooks (Figure 2, Item 13). Failure to comply may cause damage to equipment.

12. Tighten four nuts (Figure 2, Item 1) to secure batteries.

REMOVE/INSTALL BATTERIES – CONTINUED

13. Attach battery unit ground cable (Figure 2, Item 3) to negative battery terminal (Figure 2, Item 4) of right-hand battery (Figure 2, Item 7).
14. Close generator set doors.
15. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
16. Start engine, and check for proper operation (TM 9-6115-749-10).
17. Repair as required.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE

REMOVE/INSTALL MAIN DC CIRCUIT BREAKER

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Personnel Required - cont'd

Assistant (1)

Materials/Parts

Circuit breaker (WP 0100, Item 21)
 Grease, electrically conductive (WP 0163, Table 1, Item 20)
 Tag, marker (WP 0163, Table 1, Item 35)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool
 Battery ground cable removed (WP 0036, Remove/Install Batteries)
 Top body panel removed (WP 0028, Remove/Install Top Body Panel)
 Remove left-side body panel (WP 0031, Remove/Install Left-side Body Panel)

Personnel Required

91D (1)

REMOVE/INSTALL MAIN DC CIRCUIT BREAKER

WARNING

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Do not ground yourself in standing water. Failure to comply may cause injury or death to personnel and damage to equipment.

Remove Main DC Circuit Breaker**NOTE**

The main DC circuit breaker can be tested while installed or when removed from the unit. Multimeter readings should be the same as noted below regardless of breaker location. To test the main DC circuit breaker without removing it from the unit, see Test Main DC Circuit Breaker task.

REMOVE/INSTALL MAIN DC CIRCUIT BREAKER – CONTINUED

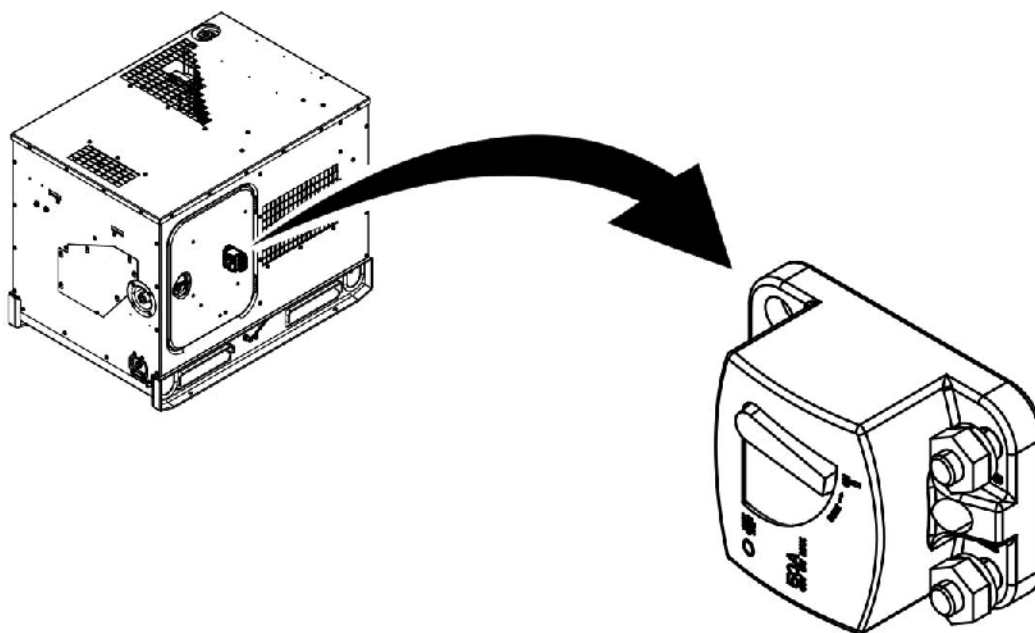


Figure 1. Main DC Circuit Breaker - Location.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Open left-side door and locate main DC circuit breaker (Figure 1) below coolant bottle on internal bulkhead panel.

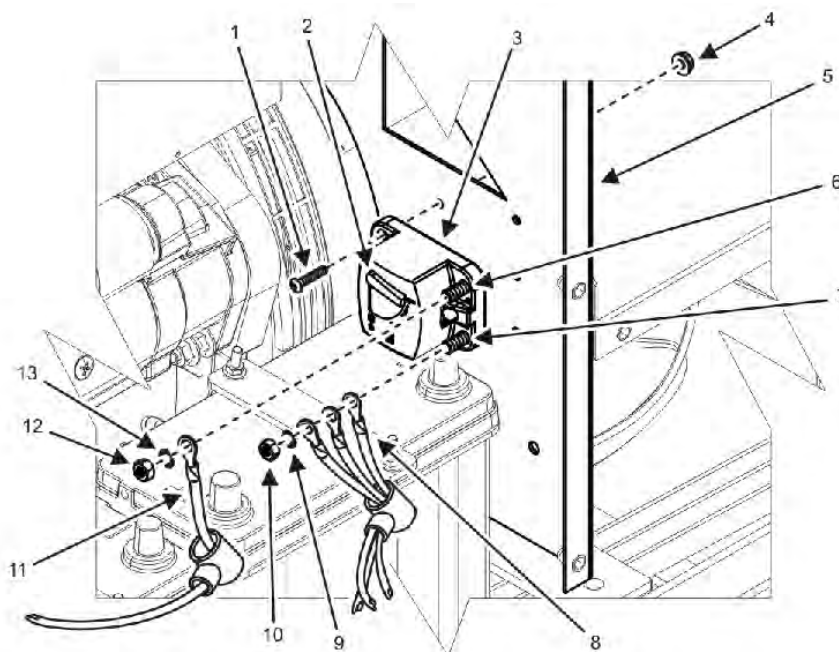


Figure 2. Main DC Circuit Breaker - Removal.

3. Set main DC circuit breaker switch (Figure 2, Item 2) to OFF/TRIP position.

REMOVE/INSTALL MAIN DC CIRCUIT BREAKER – CONTINUED

4. Remove protective caps from wires (Figure 2, Item 8) on load (lower) terminal (Figure 2, Item 7) and from wire (Figure 2, Item 11) on line (upper) terminal (Figure 2, Item 6) on the main DC circuit breaker (Figure 2, Item 3).
5. Tag and disconnect wires (Figure 2, Item 8) attached to load (lower) terminal (Figure 2, Item 7) of circuit breaker (Figure 2, Item 3) by removing nut (Figure 2, Item 10) and lockwasher (Figure 2, Item 9) securing wires (Figure 2, Item 8) to load (lower) terminal (Figure 2, Item 7).
6. Tag and disconnect wire (Figure 2, Item 11) attached to line (upper) terminal (Figure 2, Item 6) of circuit breaker (Figure 2, Item 3) by removing nut (Figure 2, Item 12) and lockwasher (Figure 2, Item 13) securing wire (Figure 2, Item 11) to line (upper) terminal (Figure 2, Item 6).
7. Discard lockwashers (Figure 2, Items 9 and 13), and set remaining mounting hardware aside for reuse.
8. Remove three hex socket head screws (Figure 2, Item 1) and three nuts (Figure 2, Item 4) securing main DC circuit breaker (Figure 2, Item 3) to interior bulkhead panel (Figure 2, Item 5), and set mounting hardware aside for reuse.
9. Remove main DC circuit breaker (Figure 2, Item 3) from interior bulkhead panel (Figure 2, Item 5), and place on a suitable work surface, or discard if being replaced.

END OF TASK**Test Main DC Circuit Breaker**

1. Inspect main DC circuit breaker (Figure 2, Item 3) for signs of damage or corrosion, and replace as required.

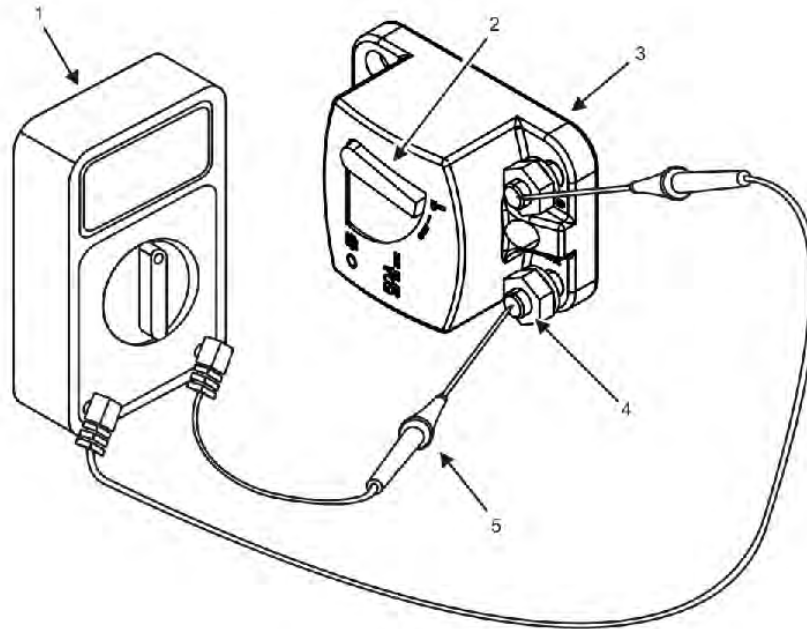


Figure 3. Test Main DC Circuit Breaker - Continuity.

2. Test main DC circuit breaker (Figure 3, Item 3) for proper continuity:
 - a. Set multimeter (Figure 3, Item 1) to ohms (Ω), and verify that multimeter (Figure 3, Item 1) is operating correctly by touching meter probes together and observing less than approximately 1 Ω on multimeter (Figure 3, Item 1).

REMOVE/INSTALL MAIN DC CIRCUIT BREAKER – CONTINUED

- b. Set main DC circuit breaker switch (Figure 3, Item 2) to ON position.

NOTE

Any multimeter (Figure 3, Item 1) reading greater than approximately 1 Ω during continuity test indicates the main DC circuit breaker (Figure 3, Item 3) is faulty and should be replaced. If main DC circuit breaker (Figure 3, Item 3) fails the continuity test, a short to ground test (see Step 3) is not necessary.

- c. Place one probe (Figure 3, Item 5) on each main DC circuit breaker terminal (Figure 3, Item 4), and verify multimeter reading is no greater than approximately 1 Ω .
- d. Replace main DC circuit breaker (Figure 3, Item 3) if multimeter reading is greater than approximately 1 Ω when main DC circuit breaker terminals (Figure 3, Item 4) are tested.

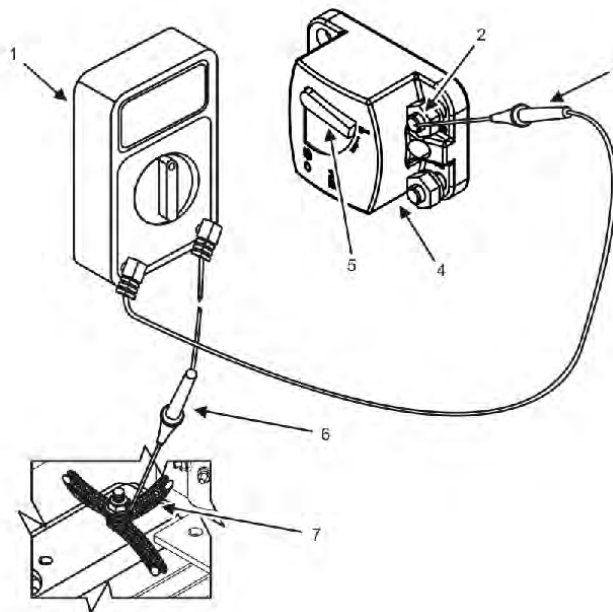


Figure 4. Test Main DC Circuit Breaker - Ground.

NOTE

A short to ground test is not necessary if the main DC circuit breaker failed the continuity test above.

The main DC circuit breaker must be installed and all load cables removed when testing for short to ground.

3. Test main DC circuit breaker (Figure 4, Item 4) for short to ground:
- Set multimeter (Figure 4, Item 1) to ohms (Ω).
 - Set main DC circuit breaker switch (Figure 4, Item 5) to ON position.
 - Place one multimeter probe (Figure 4, Item 3) on either main DC circuit breaker terminal (Figure 4, Item 2) and remaining probe (Figure 4, Item 6) on unit grounding strap (Figure 4, Item 7).
 - If multimeter is O/L (infinity), the circuit breaker is good. A resistance reading of any value indicates the breaker is damaged and must be replaced.

REMOVE/INSTALL MAIN DC CIRCUIT BREAKER – CONTINUED**END OF TASK****Install Main DC Circuit Breaker**

1. Set main DC circuit breaker switch (Figure 5, Item 2) to OFF/TRIP position.
2. Place main DC circuit breaker (Figure 5, Item 3) at mounting location below coolant recovery bottle on internal bulkhead panel (Figure 5, Item 5).
3. Install main DC circuit breaker (Figure 5, Item 3) to internal bulkhead panel (Figure 5, Item 5) using three hex socket head screws (Figure 5, Item 1) and three nuts (Figure 5, Item 4).

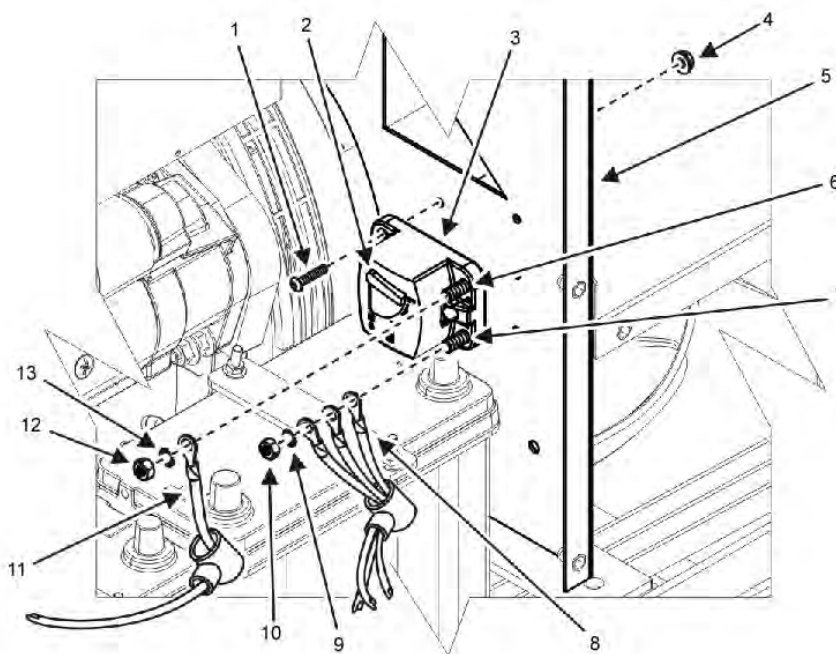


Figure 5. Install Main DC Circuit Breaker.

4. Install wires (Figure 5, Item 8) to load (lower) circuit breaker terminal (Figure 5, Item 7) as indicated by wiring tags, using new lockwasher (Figure 5, Item 9) and nut (Figure 5, Item 10) to secure wires (Figure 5, Item 8) to load (lower) terminal (Figure 5, Item 7).
5. Install wire (Figure 5, Item 11) to line (upper) circuit breaker terminal (Figure 5, Item 6) as indicated by wiring tags, using new lockwasher (Figure 5, Item 13) and nut (Figure 5, Item 12) to secure wire (Figure 5, Item 11) to line (upper) terminal (Figure 5, Item 6).
6. Replace protective caps over all DC main breaker wires (Figure 5, Items 8 and 11) and terminals (Figure 5, Items 6 and 7).
7. Verify three breaker mounting hex socket head screws (Figure 5, Item 1) and nuts (Figure 5, Item 4) are fully secured.
8. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
9. Set main DC circuit breaker switch (Figure 5, Item 2) to ON position.
10. Install left-side body panel (WP 0031, Remove/Install Left-Side Body Panel).
11. Install top body panel (WP 0028, Remove/Install Top Body Panel).

REMOVE/INSTALL MAIN DC CIRCUIT BREAKER – CONTINUED

12. Close generator set doors.
13. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
14. Start engine and check for proper operation (TM 9-6115-749-10).
15. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
REMOVE/INSTALL NATO SLAVE RECEPTACLE

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Personnel Required

91D (1)

Materials/Parts

Connector, receptacle (WP 0100, Item 18)
Grease, electrically conductive (WP 0163, Table 1, Item 20)
Tag, marker (WP 0163, Table 1, Item 35)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)

REMOVE/INSTALL NATO SLAVE RECEPTACLE**WARNING**

NATO slave receptacle is electrically live at all times and is not protected by a fuse. Disconnecting main Direct Current (DC) circuit breaker does not ensure the circuit is dead. This circuit is only dead when the batteries are fully disconnected. Disconnect both batteries before performing maintenance on the slave receptacle. Failure to comply may cause injury or death to personnel.

WARNING

The right-hand battery negative lead that connects directly to the grounding stud must be disconnected prior to disconnecting or removing batteries. Follow procedural steps in exact order given for removal and installation. Failure to comply may cause injury or death to personnel.

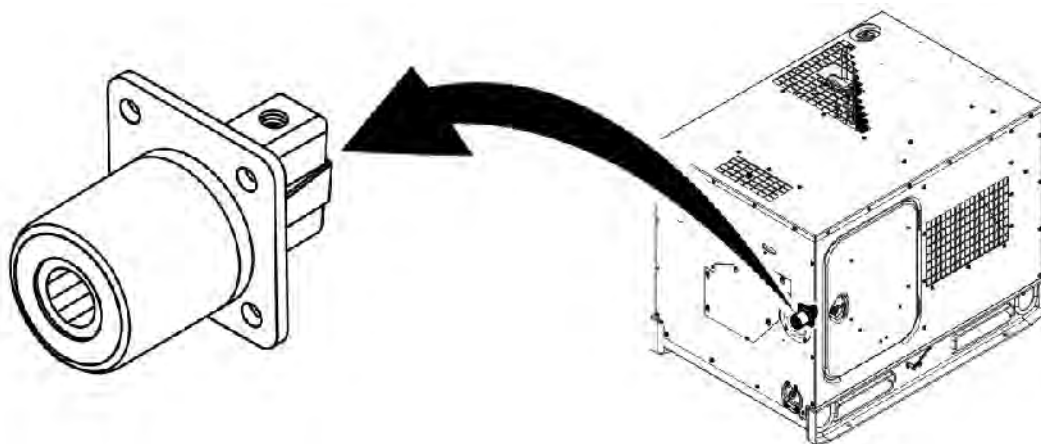
Remove NATO Slave Receptacle

Figure 1. NATO Slave Receptacle - Location.

REMOVE/INSTALL NATO SLAVE RECEPTACLE – CONTINUED

1. Ensure equipment conditions are met in order presented in initial setup.
2. Open left-side door on unit to locate NATO slave receptacle (Figure 1) and batteries.
3. Disconnect jumper cable from negative battery terminal of left-hand battery (WP 0036, Remove/Install Batteries).

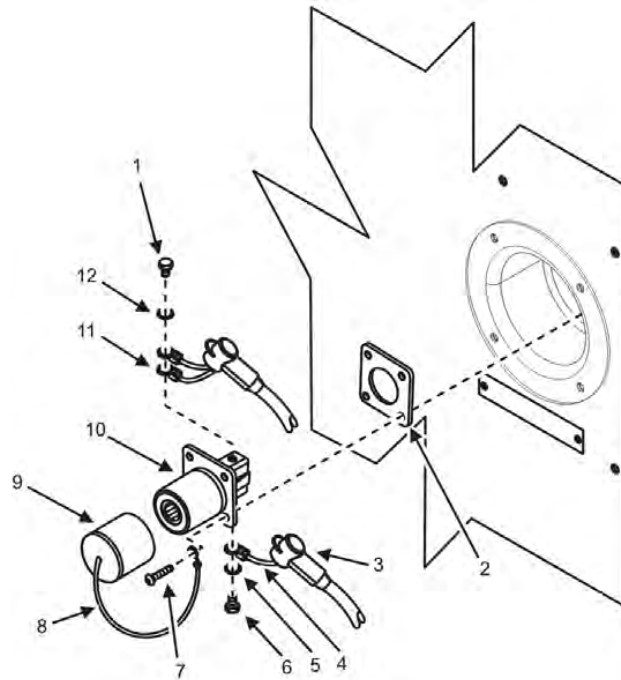


Figure 2. NATO Slave Receptacle Detail.

NOTE

Negative (-) and positive (+) symbols are stamped on the NATO slave receptacle terminal ends.

4. Re-position boot (Figure 2, Item 3). Remove bolt (Figure 2, Item 6), lockwasher (Figure 2, Item 5), and ground cable (Figure 2, Item 4) from negative side of NATO slave receptacle (Figure 2, Item 10).
5. Tag and identify ground cable (Figure 2, Item 4) for installation purposes.
6. Re-position boot (Figure 2, Item 3). Remove bolt (Figure 2, Item 1), lockwasher (Figure 2, Item 12), and two power cables (Figure 2, Item 11) from positive side of NATO slave receptacle (Figure 2, Item 10).
7. Tag and identify power cables (Figure 2, Item 11) for installation purposes.
8. Discard lockwashers (Figure 2, Items 5 and 12).
9. Remove four bolts (Figure 2, Item 7), NATO slave receptacle (Figure 2, Item 10), gasket (Figure 2, Item 2), protective cap (Figure 2, Item 9), and tether (Figure 2, Item 8) from front body panel of unit.

END OF TASK**Inspect NATO Slave Receptacle**

1. Inspect NATO slave receptacle (Figure 2, Item 10), protective cap (Figure 2, Item 9), and tether (Figure 2, Item 8) for obvious signs of damage, corrosion, or burning.

REMOVE/INSTALL NATO SLAVE RECEPTACLE – CONTINUED

2. Replace NATO slave receptacle (Figure 2, Item 10), protective cap (Figure 2, Item 9), and tether (Figure 2, Item 8) as required.
3. Inspect power and ground cables (Figure 2, Items 4 and 11) and cable ends for signs of damage. Repair or replace as required.
4. Inspect boots (Figure 2, Item 3) on positive and negative cables (Figure 2, Items 4 and 11). Replace if damaged.

END OF TASK**Install NATO Slave Receptacle**

1. Install new gasket (Figure 2, Item 2) onto terminal end of NATO slave receptacle (Figure 2, Item 10), and align mounting holes.

NOTE

For easier tool access during installation, the NATO slave receptacle can be installed with the terminals one above the other, rather than side by side.

2. Position and insert terminal end of NATO slave receptacle (Figure 2, Item 10) through mounting location on front of unit, and align mounting holes.

NOTE

Protective cap tether (Figure 2, Item 8) is attached to lower right-hand bolt (Figure 2, Item 7).

3. Position NATO slave receptacle (Figure 2, Item 10) to front of unit by installing four bolts (Figure 2, Item 7).

CAUTION

Negative (-) and positive (+) symbols are stamped on the NATO slave receptacle terminal ends. Ensure positive (+) and negative (-) cables are attached to the correct terminal ends. Failure to comply may cause damage to equipment.

4. Position two power cables (Figure 2, Item 11) onto positive side of NATO slave receptacle (Figure 2, Item 10). Refer to cable tags installed during disassembly.
5. Secure two power cables (Figure 2, Item 11) to positive side of NATO slave receptacle (Figure 2, Item 10) using bolt (Figure 2, Item 1) and new lockwasher (Figure 2, Item 12).
6. Cover bolt (Figure 2, Item 1) and new lockwasher (Figure 2, Item 12) of positive cables (Figure 2, Item 11) with boot (Figure 2, Item 3).

CAUTION

Negative (-) and positive (+) symbols are stamped on the NATO slave receptacle terminal ends. Ensure positive (+) and negative (-) cables are attached to the correct terminal ends. Failure to comply may cause damage to equipment.

7. Position ground cable (Figure 2, Item 4) onto negative side of NATO slave receptacle (Figure 2, Item 10).
8. Secure ground cable (Figure 2, Item 4) to negative side of NATO slave receptacle (Figure 2, Item 10) using bolt (Figure 2, Item 6) and new lockwasher (Figure 2, Item 5).
9. Cover mounting bolt (Figure 2, Item 6) and new lockwasher (Figure 2, Item 5) with boot (Figure 2, Item 3).
10. Install protective cap (Figure 2, Item 9) on exterior of NATO slave receptacle (Figure 2, Item 10).
11. Connect jumper cable to negative battery terminal of left-hand battery (WP 0036, Remove/Install Batteries).
12. Close left-side door of generator set.

REMOVE/INSTALL NATO SLAVE RECEPTACLE – CONTINUED

13. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
14. Start engine and check for proper operation (TM 9-6115-749-10).
15. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

SERVICE FUEL SYSTEM

INITIAL SETUP:**Test Equipment**

Beaker, Laboratory (WP 0162, Table 2, Item 3)

Personnel Required - cont'd

Assistant (1)

Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
 Wrench, Torque, Click, Ratcheting, 3/8 in Drive, 75 ft•lb (WP 0162, Table 2, Item 41)

References

WP 0017, Remove/Install DCS
 WP 0018, Repair DCS
 WP 0036, Remove/Install Batteries
 WP 0040, Remove/Install Fuel Manifold
 WP 0041, Remove/Install Fuel Pump, Main/Auxiliary
 WP 0042, Remove/Install Fuel Filter/Water Separator Assembly
 WP 0043, Replace Fuel Filter/Water Separator Element
 WP 0059, Remove/Install Engine Wiring Harness
 WP 0093, General Maintenance
 Foldout Pages

Materials/Parts

Cap set, protective (WP 0163, Table 1, Item 8)
 Cleaning compound, solvent (WP 0163, Table 1, Item 10)
 Detergent, general purpose (WP 0163, Table 1, Item 16)
 Fuel, diesel (WP 0163, Table 1, Item 19)
 Grease, electrically conductive (WP 0163, Table 1, Item 20)
 Pan, drain (WP 0163, Table 1, Item 28)
 Rag, wiping (WP 0163, Table 1, Item 31)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool

Personnel Required

91D (1)

SERVICE FUEL SYSTEM**WARNING**

Fuel is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash skin and change clothing promptly if in contact with fuel. Failure to comply may cause injury or death to personnel.

WARNING

Fuels used in the generator set are combustible. Do not smoke or use open fire when performing maintenance. Fire and possible explosion may result. Failure to comply may cause injury or death to personnel and damage to equipment.

WARNING

Make sure engine control switch is only set to PRIME & RUN during fuel system checks. Failure to comply may cause injury or death to personnel.

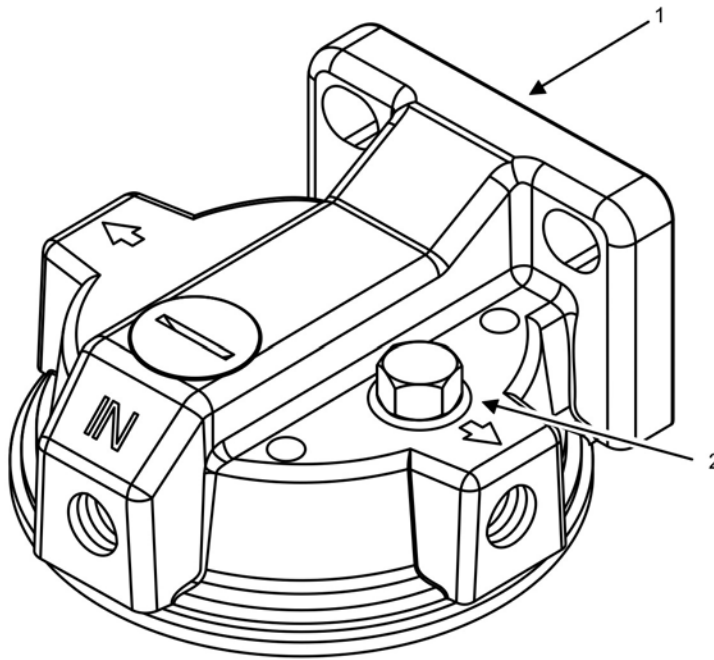
SERVICE FUEL SYSTEM – CONTINUED**Purge Fuel Lines**

Figure 1. Air Bleed Vent Plug.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Open right-side door.
3. Locate air bleed vent plug (Figure 1, Item 2) on fuel filter/water separator head (Figure 1, Item 1).
4. Place suitable container and wiping rags under air bleed vent plug (Figure 1, Item 2).
5. Remove dirt and debris on fuel filter/water separator head (Figure 1, Item 1) to prevent contamination of fuel system.

NOTE

Capture spilled fuel and dispose of IAW local SOP.

6. Remove air bleed vent plug (Figure 1, Item 2) from fuel filter/water separator head (Figure 1, Item 1).

NOTE

The use of an assistant is required for the following procedure.

7. Using assistant, turn engine control switch to PRIME & RUN to pump fuel (TM 9-6115-749-10).
8. Observe fuel flow for evidence of air in the fuel line as indicated by bubbles, frothy appearance, or breaks in flow.
9. Using assistant, turn engine control switch to OFF when evidence of air in fuel no longer appears for 2-3 sec (TM 9-6115-749-10).
10. Install air bleed vent plug (Figure 1, Item 2) to fuel filter/water separator head (Figure 1, Item 1).
11. Close right-side door.
12. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).

SERVICE FUEL SYSTEM – CONTINUED

13. Start engine and check for leaks and proper operation (TM 9-6115-749-10). Bring coolant to normal operating temperature and then apply a 100% rated load for 30 min (TM 9-6115-749-10).
14. Repeat Steps 1 through 13 if engine stops.
15. Dispose of fuel IAW local SOP.

END OF TASK**Check Fuel Flow**

1. Ensure equipment conditions are met in order presented in initial setup.
2. Check fuel level. Add fuel to fuel tank if empty. See Fill Fuel Tank task.
3. Purge fuel lines. See Purge Fuel Lines task.
4. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10) and listen to confirm fuel pump operation.
5. Continue to Step 12 if fuel pump activates.
6. Ensure electrical connector is attached to main fuel pump if fuel pump does not activate (WP 0041, Remove/Install Fuel Pump, Main/Auxiliary).

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Do not ground yourself in standing water. Failure to comply may cause injury or death to personnel and damage to equipment.

7. Disconnect main fuel pump connector (P65), and use a multimeter set to test VDC to check electrical connector pins for 24 VDC $\pm 10\%$ if electrical connector is attached but main fuel pump is not operating (WP 0093, General Maintenance).
8. Replace main fuel pump if voltage is within 24 VDC $\pm 10\%$ range (WP 0041, Remove/Install Fuel Pump, Main/Auxiliary).
9. Use wiring diagrams and troubleshoot electrical wires P2-N and P2-V for opens or shorts if voltage is outside 24 VDC $\pm 10\%$ range (Foldout Pages).
10. Repair or replace wiring if a short or open is found (WP 0093, General Maintenance and WP 0059, Remove/Install Engine Wiring Harness).
11. Test and replace DCS as required if no short or open is found (WP 0018, Repair DCS and WP 0017, Remove/Install DCS).
12. Turn engine control switch to OFF (TM 9-6115-749-10).
13. Remove fuel supply hose at fuel injection pump (WP 0042, Remove/Install Fuel Filter/Water Separator Assembly).
14. Place open end of fuel supply hose into suitable container of at least 16 oz (500 mL) to catch pumped fuel.

NOTE

The use of an assistant is required for the following procedure.

15. Using assistant, turn engine control switch to PRIME & RUN for approximately 15 sec to pump fuel through fuel supply hose (TM 9-6115-749-10).
16. Turn engine control switch to OFF (TM 9-6115-749-10).
 - a. Install fuel supply hose and proceed to Step 24 if fuel flow volume is approximately 12 oz (355 mL) after 15 sec (WP 0042, Remove/Install Fuel Filter/Water Separator Assembly).

SERVICE FUEL SYSTEM – CONTINUED

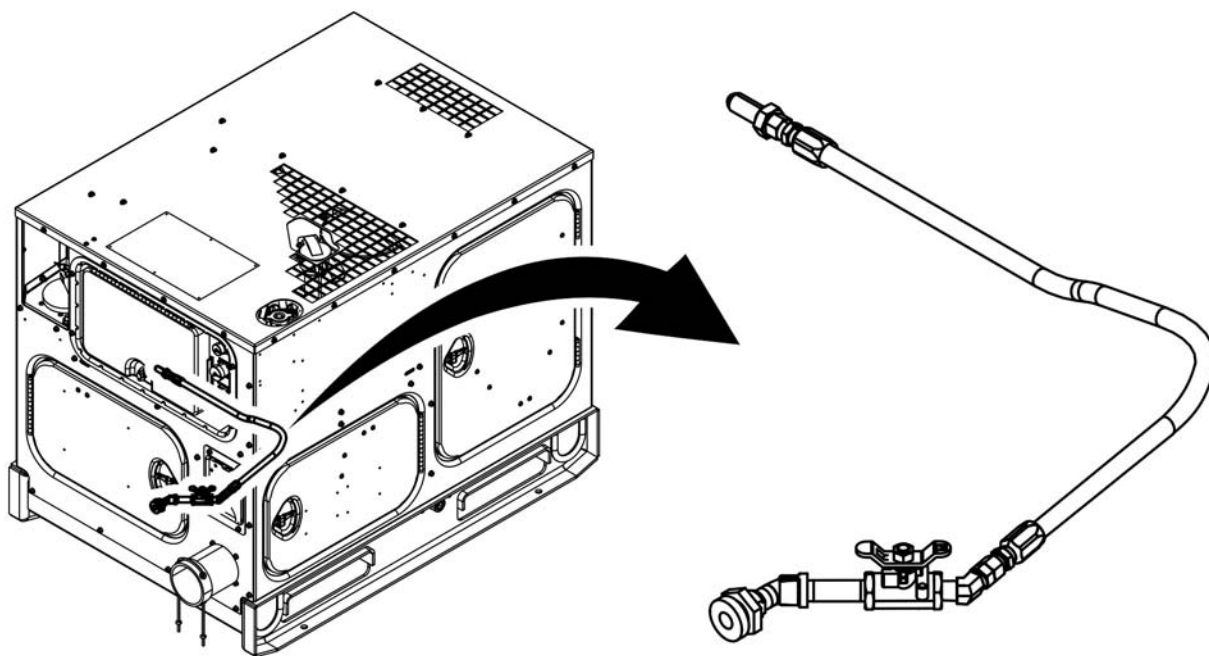
- b. Install fuel supply hose and remove fuel supply line from IN port of fuel filter/water separator if no fuel exits fuel supply hose or volume is less than approximate value in Step a (WP 0042, Remove/Install Fuel Filter/Water Separator Assembly).
- 17. Place open end of fuel supply line into suitable container to catch pumped fuel.
- 18. Using assistant, turn engine control switch to PRIME & RUN for approximately 15 sec to pump fuel through fuel supply line (TM 9-6115-749-10).
- 19. Turn engine control switch to OFF (TM 9-6115-749-10).
 - a. If fuel flow volume is approximately 12 oz (355 mL) after 15 sec, replace fuel filter/water separator element, install fuel supply line, and proceed to Step 24 (WP 0042, Remove/Install Fuel Filter/Water Separator Assembly and WP 0043, Remove/Install Fuel Filter/Water Separator Element).
 - b. If no fuel exits fuel supply line or volume is less than specification when engine control switch is turned to PRIME & RUN, service strainers in fuel manifold. See Service Fuel Strainers task.
- 20. Using assistant, turn engine control switch to PRIME & RUN for approximately 15 sec to pump fuel through fuel supply line again (TM 9-6115-749-10).
- 21. Turn engine control switch to OFF (TM 9-6115-749-10).
 - a. Install fuel supply line and proceed to Step 24 if fuel flow volume is approximately 12 oz (355 mL) after 15 sec (WP 0042, Remove/Install Fuel Filter/Water Separator Assembly).
 - b. If no fuel exits fuel supply line at fuel filter/water separator or volume is less than specification when engine control switch is turned to PRIME & RUN, inspect fuel manifold fuel pickup tube for signs of damage or restriction. Replace or repair as required (WP 0040, Remove/Install Fuel Manifold).
- 22. Using assistant, turn engine control switch to PRIME & RUN for approximately 15 sec to pump fuel through fuel supply line again (TM 9-6115-749-10).
- 23. Turn engine control switch to OFF (TM 9-6115-749-10).
 - a. Install fuel supply line and proceed to Step 24 if fuel flow volume is approximately 12 oz (355 mL) after 15 sec (WP 0042, Remove/Install Fuel Filter/Water Separator Assembly).
 - b. If no fuel exits fuel supply line at fuel filter/water separator or volume is less than specification when engine control switch is turned to PRIME & RUN, install fuel supply line, replace main fuel pump, and proceed to Step 24 (WP 0041, Remove/Install Fuel Pump, Main/Auxiliary and WP 0042, Remove/Install Fuel Filter/Water Separator Assembly).

NOTE

Wipe down all fuel lines, parts, and fittings with wiping rag prior to installation.

- 24. Close right-side door.
- 25. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
- 26. Start engine and check for leaks and proper operation (TM 9-6115-749-10). Apply 100% rated load to generator set for 30 minutes or until coolant reaches normal operating temperature (TM 9-6115-749-10).
- 27. Repeat Steps 1 through 26 if engine stops.
- 28. Dispose of fuel IAW local SOP.

END OF TASK

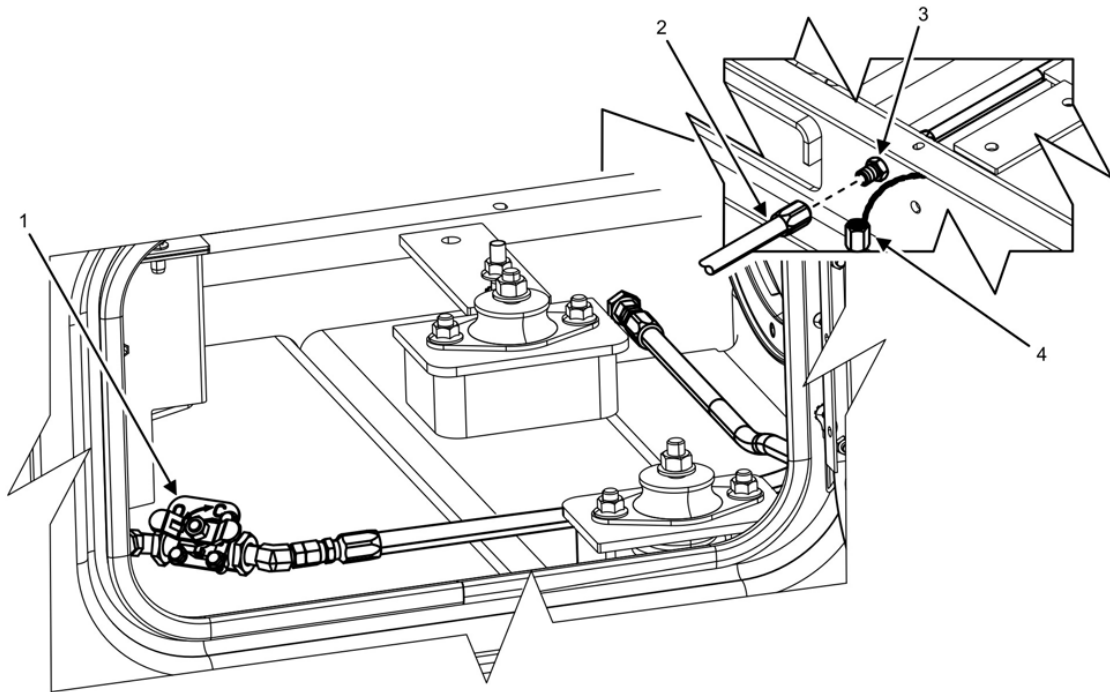
SERVICE FUEL SYSTEM – CONTINUED**Drain Fuel Tank****Figure 2. Fuel Drain - Location.**

1. Ensure equipment conditions are met in order presented in initial setup.
2. Remove any dirt and debris around fuel drain outlet cap (Figure 3, Item 4).
3. Place suitable container under fuel drain outlet (Figure 3, Item 3) to catch drained fuel.
4. Remove fuel drain outlet cap (Figure 3, Item 4) from fuel drain outlet (Figure 3, Item 3) in left-side of unit skid.
5. Obtain auxiliary fuel line (Figure 3, Item 2) from accessory box inside right-side access door.
6. Connect auxiliary fuel line (Figure 3, Item 2) to fuel drain outlet (Figure 3, Item 3).
7. Remove fuel filler cap (Figure 4, Item 2) from fuel filler neck (Figure 4, Item 1).
8. Open rear door of generator set.
9. Locate fuel drain assembly (Figure 2).

NOTE

Capture spilled fuel and dispose of IAW local SOP.

10. Open ball valve (Figure 3, Item 1) by rotating lever counter-clockwise to the open position.
11. Close ball valve (Figure 3, Item 1) when flow of fuel stops by rotating clockwise to the shut position.

SERVICE FUEL SYSTEM – CONTINUED**Figure 3. Fuel Drain - Detail.**

12. Remove auxiliary fuel line (Figure 3, Item 2) from fuel drain outlet (Figure 3, Item 3).
13. Replace fuel drain outlet cap (Figure 3, Item 4) on fuel drain outlet (Figure 3, Item 3).
14. Wipe down auxiliary fuel line (Figure 3, Item 2) and store it in accessory box inside right-side access door.
15. Clean fuel drain outlet (Figure 3, Item 3) area of fuel and dirt.
16. Dispose of soiled rags IAW local SOP.
17. Replace fuel filler cap (Figure 4, Item 2) to previous orientation.

END OF TASK**Fill Fuel Tank****WARNING**

Fuels used in the generator set are combustible. Ensure fuel source grounding strap is connected to unit fuel fill grounding stud. When filling the fuel tank, maintain metal-to-metal contact between filler nozzle and fuel tank opening to eliminate **ESD**. Failure to comply may cause injury or death to personnel.

NOTE

Note orientation of fuel cap before removal to aid in installation.

1. Ensure equipment conditions are met in order presented in initial setup.

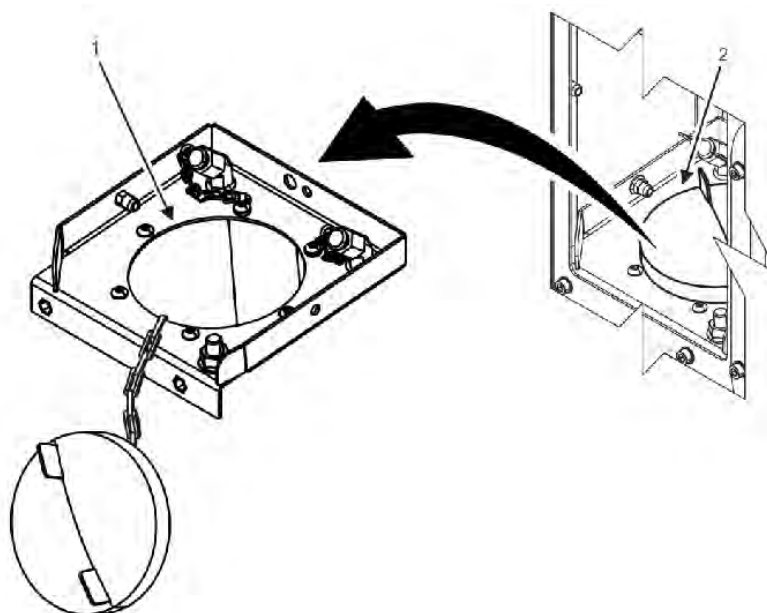
SERVICE FUEL SYSTEM – CONTINUED

Figure 4. Fuel Filler - Location.

2. Remove fuel filler cap (Figure 4, Item 2).
3. Ensure ball valve (Figure 3, Item 1) is securely closed and 90° from direction of fuel flow.
4. Add approved fuel into fuel filler opening (Figure 4, Item 1) until the level of fuel is at the top of the fuel tank.

NOTE

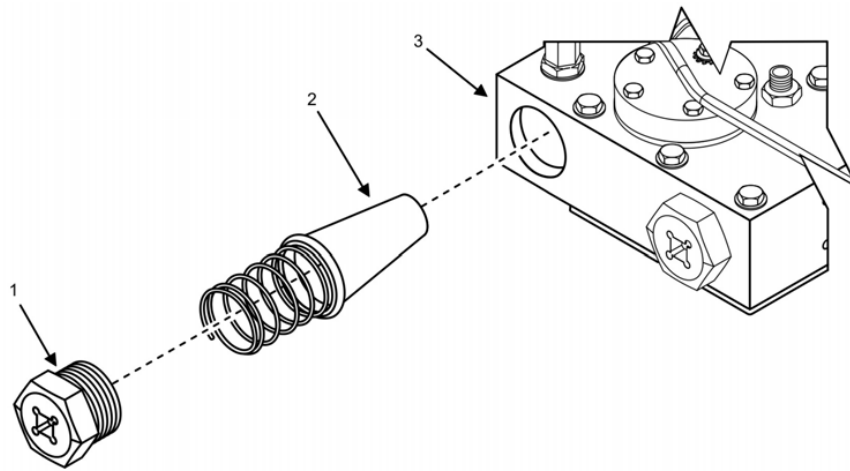
Capture and dispose of spilled fluid IAW local SOP.

5. Replace fuel filler cap (Figure 4, Item 2) to previous orientation.

END OF TASK

Service Fuel Strainers

1. Ensure equipment conditions are met in order presented in initial setup.
2. Open left-side door.
3. Remove negative ground cable from right-hand battery (WP 0036, Remove/Install Batteries).

SERVICE FUEL SYSTEM – CONTINUED**Figure 5. Fuel Strainer - Detail.**

4. Open rear door and locate fuel strainer plugs (Figure 5, Item 1) on fuel manifold (Figure 5, Item 3).
5. Remove fuel strainer plug (Figure 5, Item 1) from fuel manifold (Figure 5, Item 3).
6. Remove strainers (Figure 5, Item 2) from fuel manifold (Figure 5, Item 3).

WARNING

Compound cleaning solvent is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection is required. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply may cause injury or death to personnel.

7. Remove any dirt, debris, or blockages, and clean strainers with dry cleaning solvent.
8. Inspect strainers for holes, tears, and other signs of obvious damage and replace if required.
9. Install strainers (Figure 5, Item 2) to fuel manifold (Figure 5, Item 3).

NOTE

Wipe down fuel lines, parts, and fittings with wiping rag prior to installation.

10. Use a 3/8-in female to 1/2-in male adapter and install fuel strainer plugs (Figure 5, Item 1). Torque to 18-22 ft•lb (24-30 N•m).
11. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
12. Close generator set doors.
13. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
14. Start engine and check for leaks and proper operation (TM 9-6115-749-10). Bring coolant to normal operating temperature and then apply a 100% rated load for 30 min (TM 9-6115-749-10).
15. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

REMOVE/INSTALL FUEL MANIFOLD

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
 Torque Tube, 5-75 ft•lb (WP 0162, Table 2, Item 36)
 Torque Wrench Head End, 1/4x3/8 in Drive, 5/8 in (WP 0162, Table 2, Item 38)
 Wrench, Torque, Click, Ratcheting, 1/2 in Drive, 250 ft•lb (WP 0162, Table 2, Item 40)
 Wrench, Torque, Dial, 3/8 in Drive, 300 in•lb (WP 0162, Table 2, Item 43)

Materials/Parts

Gasket, fuel system (WP 0109, Item 49)
 Manifold, fuel (WP 0110, Item 20)
 Pipe, fuel 5 kW (WP 0110, Item 17)
 Seal, O-ring (WP 0110, Item 2)
 Washer, sealing (6) (WP 0109, Item 50)
 Brush, acid swabbing (WP 0163, Table 1, Item 5)
 Cap set, protective (WP 0163, Table 1, Item 8)
 Cleaning compound, solvent (WP 0163, Table 1, Item 10)
 Compound, sealing (WP 0163, Table 1, Item 14)
 Grease, electrically conductive (WP 0163, Table 1, Item 20)
 Pan, drain (WP 0163, Table 1, Item 28)
 Primer, sealing compound (WP 0163, Table 1, Item 30)

Materials/Parts - cont'd

Rag, wiping (WP 0163, Table 1, Item 31)
 Sealant (WP 0163, Table 1, Item 32)
 Tag, marker (WP 0163, Table 1, Item 35)

Personnel Required

91D (1)
 Assistant (1)

References

WP 0041, Fuel Pump, Main/Auxiliary
 WP 0045, Fuel Level Sensor

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool
 Battery ground cable removed (WP 0036, Remove/Install Batteries)
 Radiator support panel removed (WP 0035, Remove/Install Interior Body Panels)
 Fuel tank drained (WP 0039, Service Fuel System)

REMOVE/INSTALL FUEL MANIFOLD**WARNING**

Fuel is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash skin and change clothing promptly if in contact with fuel. Failure to comply may cause injury or death to personnel.

WARNING

Fuels used in the generator set are combustible. Do not smoke or use open fire when performing maintenance. Fire and possible explosion may result. Failure to comply may cause injury or death to personnel and damage to equipment.

REMOVE/INSTALL FUEL MANIFOLD – CONTINUED**Remove Fuel Manifold Assembly****NOTE**

Tag and/or index all connections before removal.

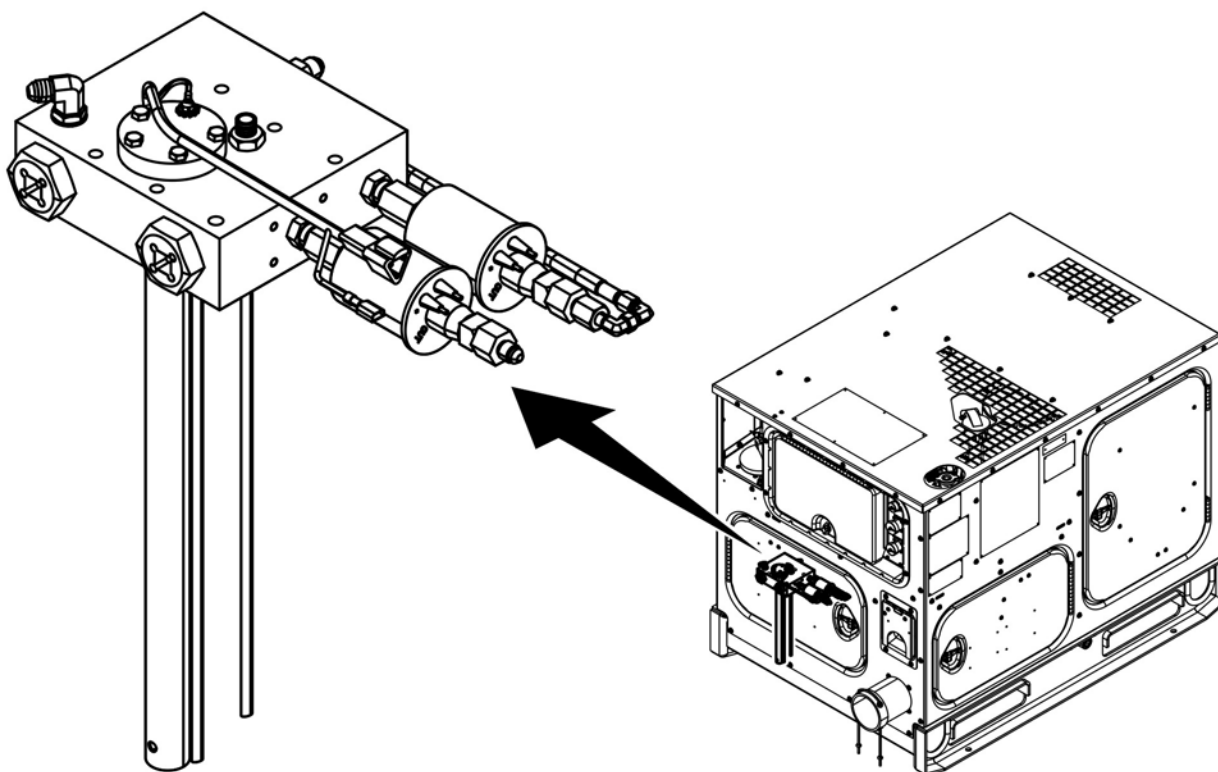
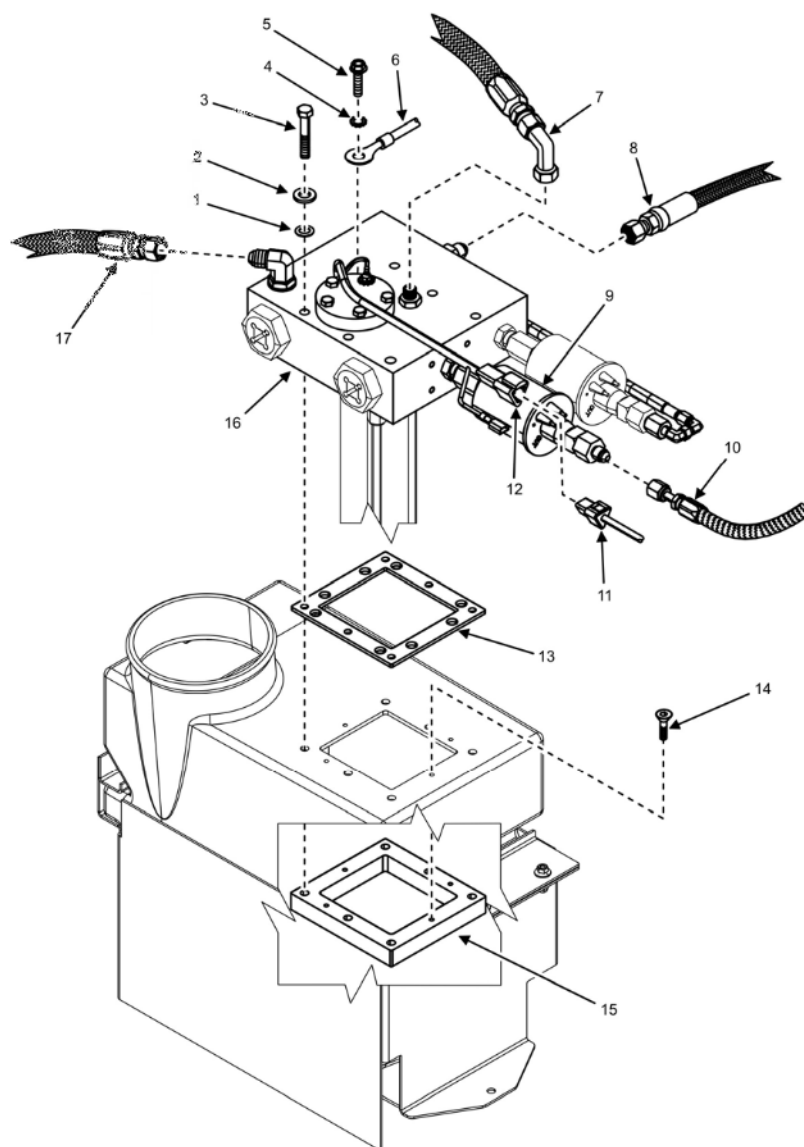


Figure 1. Fuel Manifold Assembly - Location.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate fuel manifold assembly (Figure 1).
3. Disconnect electrical connector (Figure 2, Item 12) from engine wiring harness (Figure 2, Item 11).

REMOVE/INSTALL FUEL MANIFOLD – CONTINUED

**Figure 2. Fuel Manifold Assembly - Removal.**

4. Remove screw (Figure 2, Item 5), external tooth lockwasher (Figure 2, Item 4), and ground wire (Figure 2, Item 6) from fuel manifold (Figure 3, Item 16).

NOTE

Capture spilled fuel and dispose of IAW local SOP. Dispose of soiled rags IAW local SOP.

To prevent contamination from entering the fuel system, cap/plug all open fuel lines and fittings.

5. Remove fuel supply line (Figure 2, Item 10) from main fuel pump (Figure 2, Item 9).
6. Place wiping rags around auxiliary fuel intake and vent lines (Figure 2, Items 17 and 7) on fuel manifold assembly (Figure 2, Item 16) to capture spilled fuel when lines are removed.

REMOVE/INSTALL FUEL MANIFOLD – CONTINUED

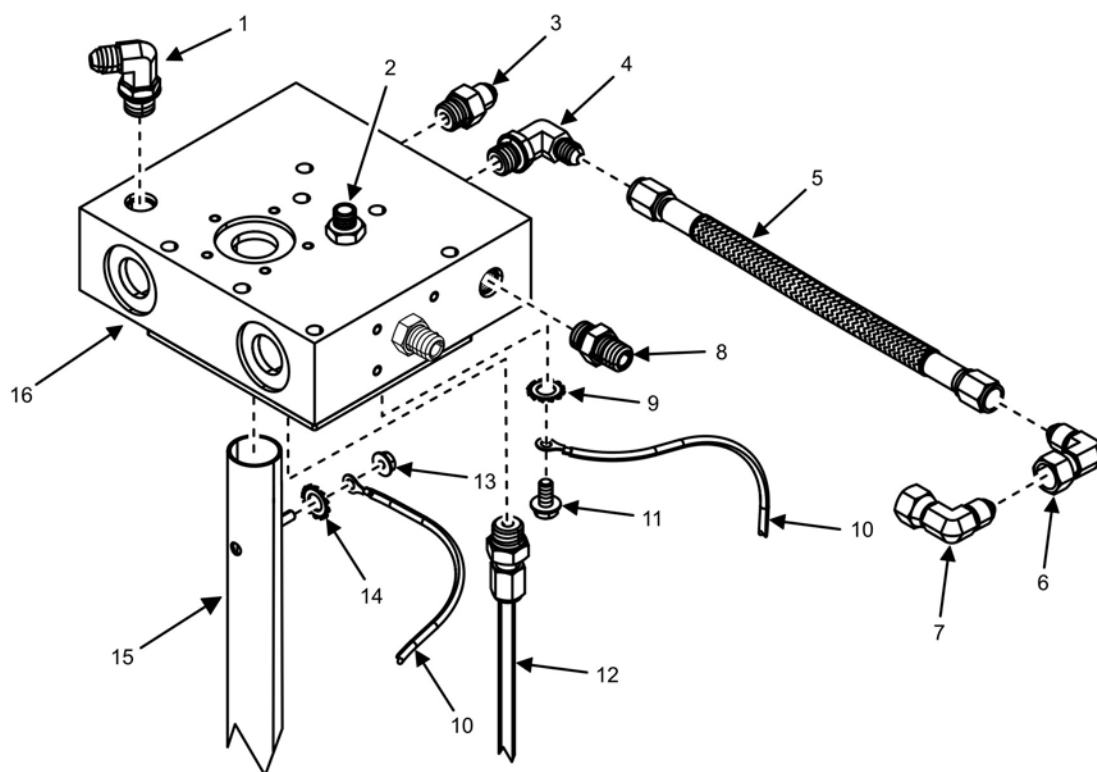
7. Remove auxiliary fuel intake line (Figure 2, Item 17) from fuel manifold assembly (Figure 2, Item 16).
8. Inspect auxiliary fuel intake line (Figure 2, Item 17) for obvious damage and replace as required.
9. Remove auxiliary fuel vent line (Figure 2, Item 7) from fuel manifold assembly (Figure 2, Item 16).
10. Inspect auxiliary fuel vent line (Figure 2, Item 7) for obvious damage and replace as required.
11. Remove fuel return line (Figure 2, Item 8) from fuel manifold assembly (Figure 2, Item 16).
12. Inspect fuel return line (Figure 2, Item 8) for obvious damage and replace as required.
13. Remove six screws (Figure 2, Item 3), flat washers (Figure 2, Item 2), and sealing washers (Figure 2, Item 1) that secure fuel manifold assembly (Figure 2, Item 16) to fuel tank.
14. Discard six sealing washers (Figure 2, Item 1).
15. Remove fuel manifold assembly (Figure 2, Item 16) from fuel tank and place on a suitable work surface.
16. Remove fuel manifold assembly gasket (Figure 2, Item 13) from fuel tank. Discard fuel manifold assembly gasket (Figure 2, Item 13).
17. Inspect gasket retainer (Figure 2, Item 15) inside fuel tank for signs of obvious damage. Replace gasket retainer (Figure 2, Item 15) as required.
 - a. Remove two flat screws (Figure 2, Item 14) while supporting gasket retainer (Figure 2, Item 15).
 - b. Tilt and remove gasket retainer (Figure 2, Item 15) through fuel tank opening.

WARNING

Compound cleaning solvent is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection is required. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply may cause injury or death to personnel.

18. Remove any residual gasket material from fuel tank and fuel manifold assembly (Figure 2, Item 16) using solvent, brush, and rags.
19. Cover hole in fuel tank to prevent dirt and debris from contaminating the fuel system.

END OF TASK

REMOVE/INSTALL FUEL MANIFOLD – CONTINUED**Disassemble Fuel Manifold Assembly****Figure 3. Fuel Manifold Assembly - Components.**

1. Remove screw (Figure 3, Item 11), external tooth lockwasher (Figure 3, Item 9), and wire (Figure 3, Item 10) from under fuel manifold (Figure 3, Item 16).
2. Remove nut (Figure 3, Item 13), external tooth lockwasher (Figure 3, Item 14), and wire (Figure 3, Item 10) from stud of fuel tube (Figure 3, Item 15).
3. Remove main and auxiliary fuel pumps (WP 0041, Remove/Install Fuel Pump, Main/Auxiliary).
4. Remove fuel level sensor (WP 0045, Remove/Install Fuel Level Sensor).
5. Remove fuel strainers (WP 0039, Service Fuel System).
6. Disconnect fuel auxiliary line (Figure 3, Item 5) from fuel manifold (Figure 3, Item 16).
7. Inspect fuel auxiliary line (Figure 3, Item 5) for obvious signs of damage and replace as required.
8. Inspect two elbow fittings (Figure 3, Items 6 and 7) on fuel auxiliary line (Figure 3, Item 5) for obvious signs of damage and replace damaged elbow fitting (Figure 3, Items 6 and 7) as required.
9. Remove two fuel supply tubes (Figure 3, Item 12) from fuel manifold (Figure 3, Item 16).
10. Inspect two fuel supply tubes (Figure 3, Item 12) for obvious signs of damage and replace as required or save for reuse.
11. Remove two pump fittings (Figure 3, Item 8) from fuel manifold (Figure 3, Item 16).
12. Inspect two pump fittings (Figure 3, Item 8) for obvious signs of damage and replace as required or save for reuse.

REMOVE/INSTALL FUEL MANIFOLD – CONTINUED**NOTE**

Note orientation of auxiliary fuel elbows (Figure 3, Item 1) before removal to aid in installation.

13. Remove auxiliary fuel elbow (Figure 3, Item 1) and straight fitting (Figure 3, Item 2) from fuel manifold (Figure 3, Item 16).
14. Inspect auxiliary fuel elbow (Figure 3, Item 1) and straight fitting (Figure 3, Item 2) for obvious signs of damage. Replace as required or save for reuse.
15. Remove elbow fitting (Figure 3, Item 3) from fuel manifold assembly (Figure 2, Item 13).
16. Inspect elbow fitting (Figure 3, Item 3) for obvious signs of damage. Replace as required or save for reuse.
17. Remove straight fitting (Figure 3, Item 2) from fuel manifold assembly (Figure 2, Item 13).
18. Inspect straight fitting (Figure 3, Item 2) for obvious signs of damage. Replace as required or save for reuse.

END OF TASK**Inspect Fuel Manifold Assembly****NOTE**

Fuel tube (Figure 3, Item 15) is permanently attached to fuel manifold (Figure 3, Item 16) at assembly. If either part is damaged, both parts must be replaced.

1. Inspect fuel manifold (Figure 3, Item 16) and fuel tube (Figure 3, Item 15) for cracks, leaks, and other signs of obvious damage. If either part is damaged, replace fuel manifold (Figure 3, Item 16) and fuel tube (Figure 3, Item 15).
2. Remove any residual sealant from fuel manifold ports and all fittings that will be reused at assembly.

END OF TASK**Assemble Fuel Manifold Assembly****WARNING**

Follow tag index procedure performed during removal task for assembly of fuel manifold. Failure to comply may cause injury or death to personnel or damage to equipment.

NOTE

If replacing fuel manifold (Figure 3, Item 16), new fuel tube (Figure 3, Item 15) must be assembled to new fuel manifold (Figure 3, Item 16) using primer and adhesive. Cure time for this process is 24 h before the assembly can be exposed to fuel.

Wipe down fuel lines, manifold, and fittings with wiping rag prior to installation.

1. Apply primer and adhesive to mounting surfaces of new fuel tube (Figure 3, Item 15) and new fuel manifold (Figure 3, Item 16).
2. Insert new fuel tube (Figure 3, Item 15) into new fuel manifold (Figure 3, Item 16).
3. Remove any beads of adhesive from inside fuel tube (Figure 3, Item 15) and fuel manifold (Figure 3, Item 16). Adhesive must cure 24 h before contact with fuel.
4. Install screw (Figure 3, Item 11), external tooth lockwasher (Figure 3, Item 9), and wire (Figure 3, Item 10) to under fuel manifold (Figure 3, Item 16). Torque screw (Figure 3, Item 11) to 44-53 in•lb (5-6 N•m).
5. Install nut (Figure 3, Item 13), external tooth lockwasher (Figure 3, Item 14), and wire (Figure 3, Item 10) from stud of fuel tube (Figure 3, Item 15). Torque nut (Figure 3, Item 13) to 1 ft•lb (1-2 N•m).

REMOVE/INSTALL FUEL MANIFOLD – CONTINUED**NOTE**

To provide proper seal against fuel leaks, apply thread sealant to pipe threads of all fittings prior to assembly. Sealant must cure for 30 min before fuel manifold can be exposed to fuel. Torque value for fittings is 18-20 ft•lb (25-27 N•m).

6. Apply thread sealant to pipe threads of elbow fitting (Figure 3, Item 4).
7. Install elbow fitting (Figure 3, Item 4) to proper orientation on fuel manifold assembly (Figure 2, Item 16). Torque elbow fittings to 18-20 ft•lb (25-27 N•m). Do not expose fuel manifold assembly (Figure 2, Item 16) to fuel for 30 min until sealant has cured.
8. Apply thread sealant to pipe threads of straight fitting (Figure 3, Item 3).
9. Install straight fitting (Figure 3, Item 3) to fuel manifold (Figure 3, Item 16). Torque straight fittings to 18-22 ft•lb (24-30 N•m). Do not expose fuel manifold (Figure 3, Item 16) to fuel for 30 min until sealant has cured.
10. Apply thread sealant to pipe threads of two auxiliary fuel elbows (Figure 3, Item 1) and straight fitting (Figure 3, Item 2).
11. Install auxiliary fuel elbow (Figure 3, Item 1) to proper orientation and straight fitting (Figure 3, Item 2) on fuel manifold (Figure 3, Item 16). Torque straight fitting to 18-20 ft•lb (25-27 N•m). Do not expose fuel manifold to fuel for 30 min until sealant has cured.
12. Apply thread sealant to pipe threads of two pump fittings (Figure 3, Item 8).
13. Install two pump fittings (Figure 3, Item 8) to fuel manifold (Figure 3, Item 16). Torque fittings to 18-20 ft•lb (25-27 N•m). Do not expose fuel manifold to fuel for 30 min until sealant has cured.
14. Apply thread sealant to pipe threads of two fuel supply tubes (Figure 3, Item 12).
15. Install fuel supply tubes (Figure 3, Item 12) to fuel manifold (Figure 3, Item 16). Torque fuel supply tubes to 18-20 ft•lb (25-27 N•m). Do not expose fuel manifold to fuel for 30 min until sealant has cured.

NOTE

To provide proper seal against fuel leaks, apply thread sealant to pipe threads of all fittings prior to assembly. Sealant must cure for 30 min before fuel manifold can be exposed to fuel. Torque value for fittings is 10-12 ft•lb (14-17 N•m).

16. Apply thread sealant to pipe threads of two elbow fittings (Figure 3, Items 6 and 7) if removed.
17. Install two elbow fittings (Figure 3, Items 6 and 7) to fuel auxiliary line (Figure 3, Item 5) as required.
18. Install fuel auxiliary line (Figure 3, Item 5) to fuel manifold (Figure 3, Item 16) assembly.
19. Install fuel plugs and strainers (WP 0039, Service Fuel System).
20. Install fuel level sensor (WP 0045, Remove/Install Fuel Level Sensor).
21. Install fuel pumps (WP 0041, Remove/Install Fuel Pump, Main/Auxiliary).

END OF TASK**Install Fuel Manifold Assembly**

1. Install gasket retainer (Figure 2, Item 15) if removed.
 - a. Insert gasket retainer (Figure 2, Item 15) through opening in fuel tank and align mounting holes.
 - b. Install two flat screws (Figure 2, Item 14) through mounting holes in tank to secure gasket retainer (Figure 2, Item 15) to inside fuel tank.
 - c. Torque two flat screws (Figure 2, Item 14) to 8-10 in•lb (1 N•m).
2. Position new fuel manifold assembly gasket (Figure 2, Item 13) on top of fuel tank and align mounting holes.

REMOVE/INSTALL FUEL MANIFOLD – CONTINUED

3. Position fuel manifold assembly (Figure 2, Item 16) to top of fuel tank and fuel manifold assembly gasket (Figure 2, Item 13) and align mounting holes.
4. Secure fuel manifold assembly (Figure 2, Item 16) to fuel tank by installing six screws (Figure 2, Item 3) with flat washers (Figure 2, Item 2) and six new sealing washers (Figure 2, Item 1) through fuel manifold assembly (Figure 2, Item 16) and gasket retainer (Figure 2, Item 15).
5. Tighten six screws (Figure 2, Item 3) in a cross pattern. Torque screws to 43-47 in•lb (5 N•m).

NOTE

Wipe down fuel lines, manifold, and fittings with wiping rag prior to installation.

6. Install auxiliary fuel vent line (Figure 2, Item 7) to straight fitting on fuel manifold assembly (Figure 2, Item 16). Torque line to 120-192 in•lb (14-16 N•m).
7. Install auxiliary fuel intake line (Figure 2, Item 17) to elbow on fuel manifold assembly (Figure 2, Item 16). Torque line to 120-192 in•lb (14-16 N•m).
8. Install fuel return line (Figure 2, Item 8) to fuel manifold assembly (Figure 2, Item 16).
9. Install fuel supply line (Figure 2, Item 10) to main fuel pump (Figure 2, Item 9).
10. Install screw (Figure 2, Item 5), external tooth lockwasher (Figure 2, Item 4), and ground wire (Figure 2, Item 6) to fuel manifold assembly (Figure 2, Item 16). Torque screw (Figure 2, Item 5) to 84-108 in•lb (10-12 N•m).
11. Connect electrical connector (Figure 2, Item 12) to engine wiring harness (Figure 2, Item 11).
12. Fill fuel tank (WP 0039, Service Fuel System).
13. Install radiator support panel (WP 0035, Remove/Install Interior Body Panels). Fill fuel tank (WP 0039, Service Fuel System).
14. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
15. Purge fuel system (WP 0039, Service Fuel System).
16. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
17. Start engine and check for proper operation. Bring coolant to normal operating temperature and then apply a 100% rated load for 30 min (TM 9-6115-749-10).
18. Repair as required.
19. Dispose of captured fuel and soiled rags IAW local SOP.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

REMOVE/INSTALL FUEL PUMP, MAIN/AUXILIARY

INITIAL SETUP:

Tools and Special Tools

Crowfoot Attachment Set, Socket Wrench, Flare
 Nut, Standard (WP 0162, Table 2, Item 13)
 Tool Kit, General Mechanic's (GMTK) (WP 0162,
 Table 2, Item 33)
 Wrench, Torque, Click, Ratcheting, 3/8 in Drive, 75
 ft•lb (WP 0162, Table 2, Item 41)

Personnel Required

91D (1)
 Assistant (1)

References

WP 0039, Service Fuel System

Materials/Parts

Pump, fuel, electric (2) (WP 0110, Item 11)
 Cap set, protective (WP 0163, Table 1, Item 8)
 Grease, electrically conductive (WP 0163, Table
 1, Item 20)
 Rag, wiping (WP 0163, Table 1, Item 31)
 Sealant (WP 0163, Table 1, Item 32)
 Tag, marker (WP 0163, Table 1, Item 35)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP
 0005)
 Engine cool
 Battery ground cable removed (WP 0036, Remove/
 Install Batteries)
 Top body panel removed (WP 0028, Remove/Install
 Top Body Panel)
 DCS removed (WP 0017, Remove/Install DCS)

REMOVE/INSTALL FUEL PUMP, MAIN/AUXILIARY

WARNING

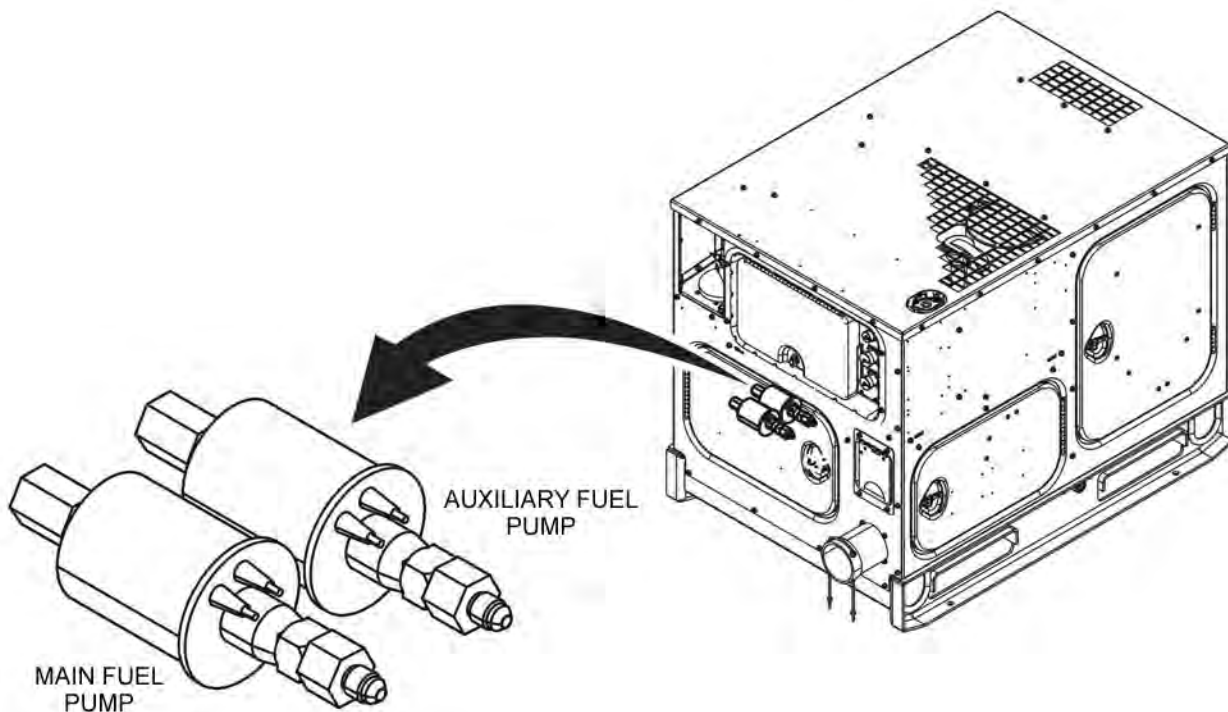
Fuel is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash skin and change clothing promptly if in contact with fuel. Failure to comply may cause injury or death to personnel.

WARNING

Fuels used in the generator set are combustible. Do not smoke or use open fire when performing maintenance. Fire and possible explosion may result. Failure to comply may cause injury or death to personnel and damage to equipment.

NOTE

Removing the main fuel pump and the auxiliary fuel pump require the same procedure. Fuel supply line connects main fuel pump to fuel filter/water separator. An auxiliary fuel line attaches auxiliary fuel pump to fuel manifold.

REMOVE/INSTALL FUEL PUMP, MAIN/AUXILIARY – CONTINUED**Remove Fuel Pump****Figure 1. Fuel Pump - Location.**

1. Ensure equipment conditions are met in order presented in initial setup.
2. Open rear panel door.
3. Locate fuel pump to be removed (Figure 1) through interior panel gap.
4. Tag electrical connectors (Figure 2, Item 2) to facilitate installation if removing both fuel pumps.
5. Disconnect electrical connectors (Figure 2, Item 2) from unit wiring harness connector (Figure 2, Item 3).
6. Inspect electrical connectors (Figure 2, Item 2) for fraying and other signs of obvious damage and replace as required.

NOTE

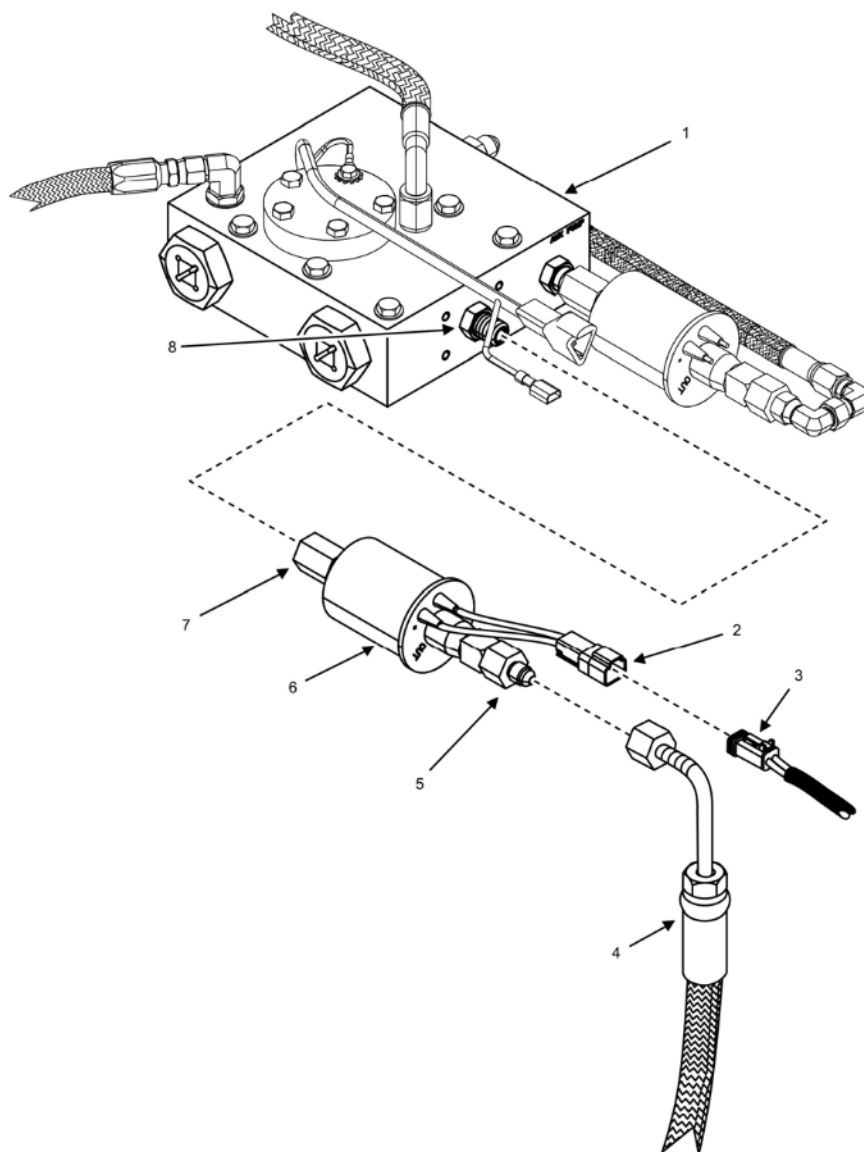
Capture and dispose of spilled fuel IAW local SOP. Cap/plug open fuel lines to prevent dirt and debris from entering the fuel system.

7. Place suitable catch container and wiping rag under fuel pumps (Figure 2, Item 6) to capture spilled fuel.

NOTE

Two wrenches are required to separate this fitting.

8. Disconnect fitting of fuel line (Figure 2, Item 4) from fuel pump male fitting (Figure 2, Item 5). Cap/plug line to prevent dirt and debris from entering the fuel system.
9. Inspect fuel line (Figure 2, Item 4) line and fitting for obvious signs of damage and replace as required.
10. Loosen fuel pump fitting (Figure 2, Item 7) from fuel manifold connector fitting (Figure 2, Item 8).
11. Remove fuel pump (Figure 2, Item 6) from manifold (Figure 2, Item 1) by turning fuel pump fitting (Figure 2, Item 7) counterclockwise.

REMOVE/INSTALL FUEL PUMP, MAIN/AUXILIARY – CONTINUED**Figure 2. Fuel Pump - Detail.**

12. Place fuel pump (Figure 2, Item 6) on suitable work surface.
13. Remove old thread sealant from fuel manifold connector fitting (Figure 2, Item 8) and fuel pump male fitting (Figure 2, Item 5).

END OF TASK**Inspect Fuel Pump**

1. Inspect fuel pump fitting (Figure 2, Item 7) for cracks and other obvious signs of damage. Replace pump as required.
2. Inspect fuel pump male fitting (Figure 2, Item 5) for cracks and other obvious signs of damage. Replace pump as required.

REMOVE/INSTALL FUEL PUMP, MAIN/AUXILIARY – CONTINUED

3. Inspect fuel pump (Figure 2, Item 6) for wear and other signs of obvious damage. Replace as required.
4. Inspect fuel manifold connector fitting (Figure 2, Item 8) for signs of obvious damage and replace as required.

END OF TASK**Install Fuel Pump****CAUTION**

Be sure to install fuel pump (Figure 2, Item 6) in proper direction relative to fuel flow. The flow from this pump is outward. Failure to comply may cause damage to equipment.

NOTE

Installing the main fuel pump and the auxiliary fuel pump require the same procedure. Fuel supply line connects main fuel pump to fuel filter/water separator. An auxiliary fuel line attaches auxiliary fuel pump to fuel manifold.

Capture and dispose of spilled fluid IAW local SOP. Remove all caps/plugs from fuel lines/fittings prior to installation of each fuel line.

Wipe down fuel lines, pumps, and fittings with wiping rag prior to installation.

Sealant cure time is 30 min to use fuel system and 72 h for full strength.

1. Apply sealant to fuel manifold connector fitting (Figure 2, Item 8) and fuel pump male fitting (Figure 2, Item 5).
2. Position fuel pump (Figure 2, Item 6) to fuel manifold connector fitting (Figure 2, Item 8) and finger-tighten.
3. Tighten fuel pump (Figure 2, Item 6) 1 to 1-1/2 turns past finger-tight.
4. Tighten fuel pump fitting (Figure 2, Item 7) an extra one and one-half turns.
5. Position fuel line (Figure 2, Item 4) to fuel pump male fitting (Figure 2, Item 5) and finger-tighten fuel pump male fitting (Figure 2, Item 5).
6. Tighten fuel pump male fitting (Figure 2, Item 5) an extra one and one-half turns.
7. Remove tags from electrical connectors (Figure 2, Item 2) if necessary.
8. Connect fuel pump electrical connector (Figure 2, Item 2) to unit wiring harness connector (Figure 2, Item 3).
9. Install DCS (WP 0017, Remove/Install DCS).
10. Install top body panel (WP 0028, Remove/Install Top Body Panel).
11. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
12. Purge fuel system (WP 0039, Service Fuel System).
13. Close generator set doors.
14. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
15. Start engine and check for proper operation. Bring coolant to normal operating temperature and then apply a 100% rated load for 30 min (TM 9-6115-749-10).
16. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

REMOVE/INSTALL FUEL FILTER/WATER SEPARATOR ASSEMBLY

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
 Wrench, Oil Filter, Strap (WP 0162, Table 2, Item 39)
 Wrench, Torque, Dial, 1/4 in Drive, 30 in•lb (WP 0162, Table 2, Item 42)
 Wrench, Torque, Dial, 3/8 in Drive, 300 in•lb (WP 0162, Table 2, Item 43)

Personnel Required

91D (1)

References

WP 0043, Remove/Install Fuel Filter/Water Separator Element

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool
 Battery ground cable removed (WP 0036, Remove/Install Batteries)

Materials/Parts

Filter, element (1) (WP 0111, Item 7)
 Separator, fuel water (1) (WP 0111, Item 6)
 Cap set, protective (WP 0163, Table 1, Item 8)
 Grease, electrically conductive (WP 0163, Table 1, Item 20)
 Rag, wiping (WP 0163, Table 1, Item 31)
 Sealant (WP 0163, Table 1, Item 32)
 Tag, marker (WP 0163, Table 1, Item 35)

REMOVE/INSTALL FUEL FILTER/WATER SEPARATOR ASSEMBLY

WARNING

Fuel is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash skin and change clothing promptly if in contact with fuel. Failure to comply may cause injury or death to personnel.

WARNING

Fuels used in the generator set are combustible. Do not smoke or use open fire when performing maintenance. Fire and possible explosion may result. Failure to comply may cause injury or death to personnel and damage to equipment.

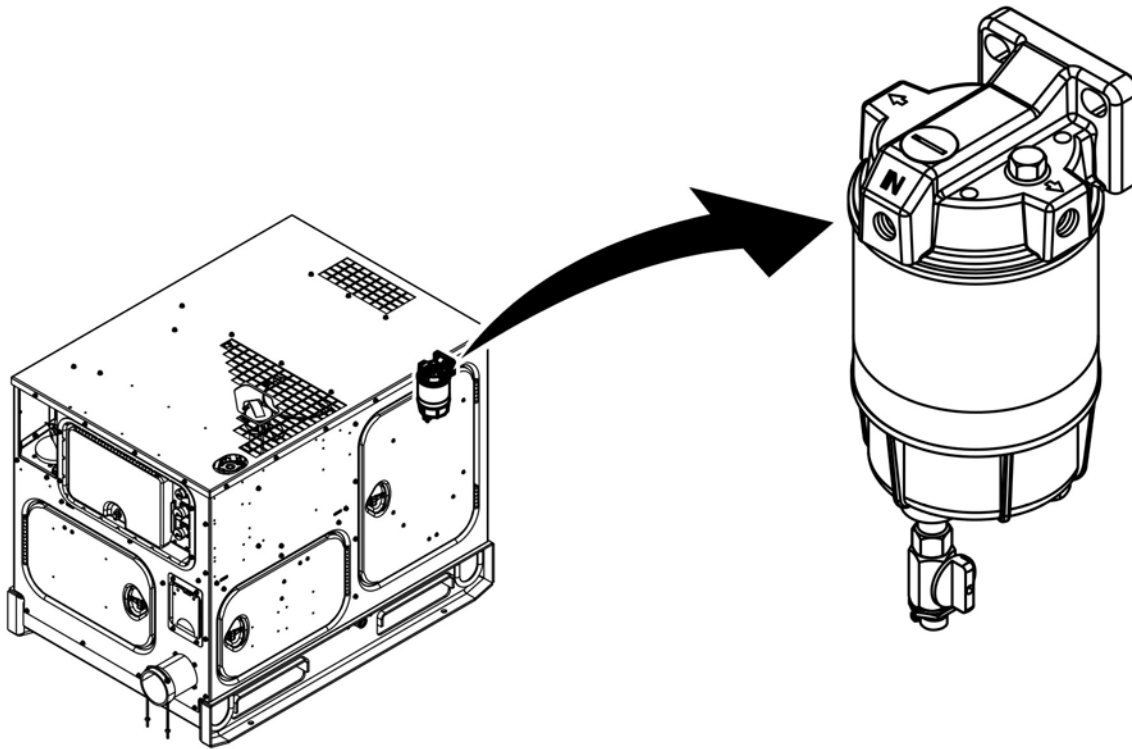
REMOVE/INSTALL FUEL FILTER/WATER SEPARATOR ASSEMBLY – CONTINUED**Remove Fuel Filter/Water Separator Assembly**

Figure 1. Fuel Filter/Water Separator Assembly - Location.

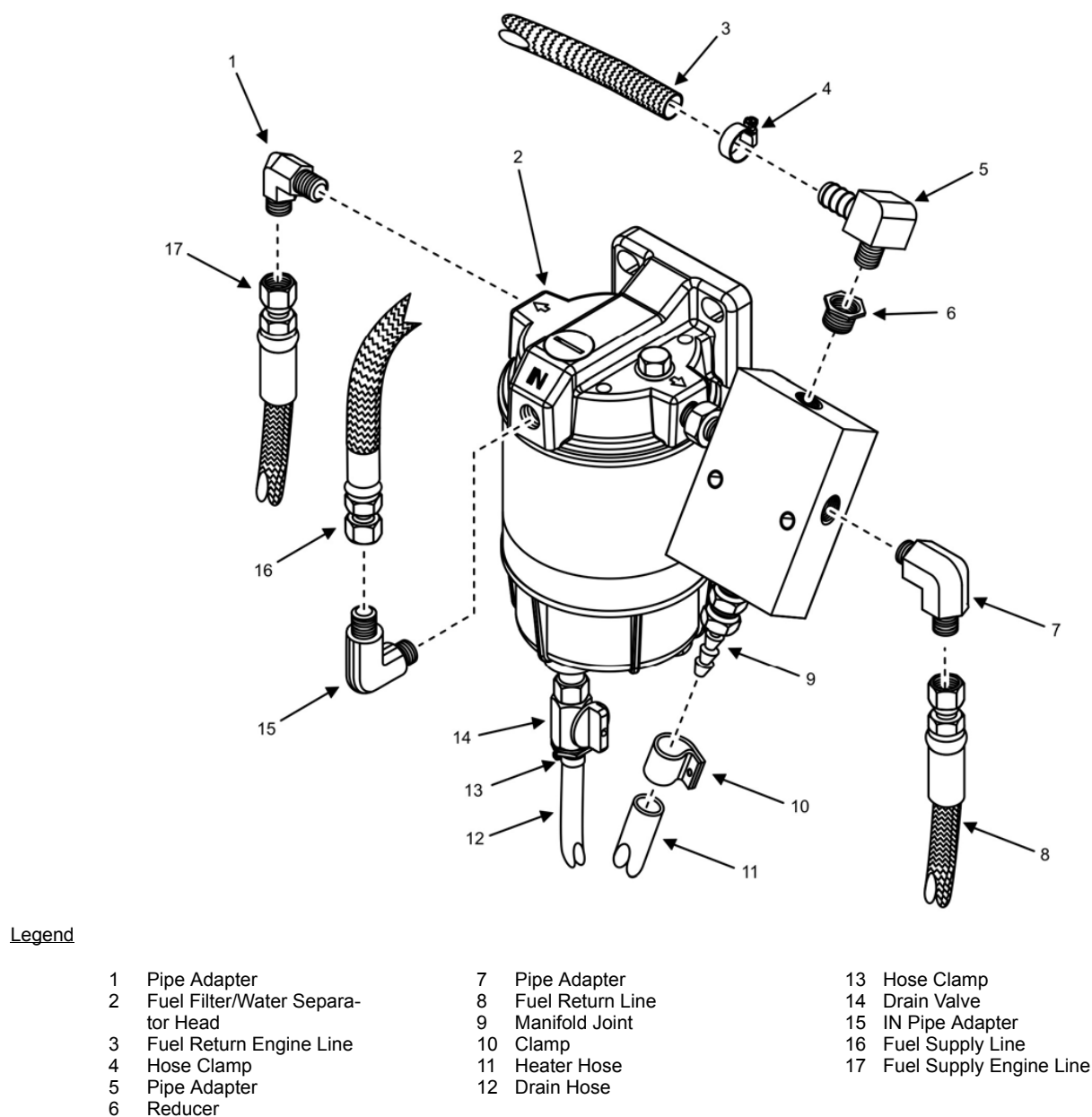
NOTE

Capture spilled fuel and dispose of with IAW local SOP. Cap/plug all open fuel lines/fittings to prevent dirt and debris from entering the fuel system.

Tag fuel lines and hoses after removal of each line to aid installation.

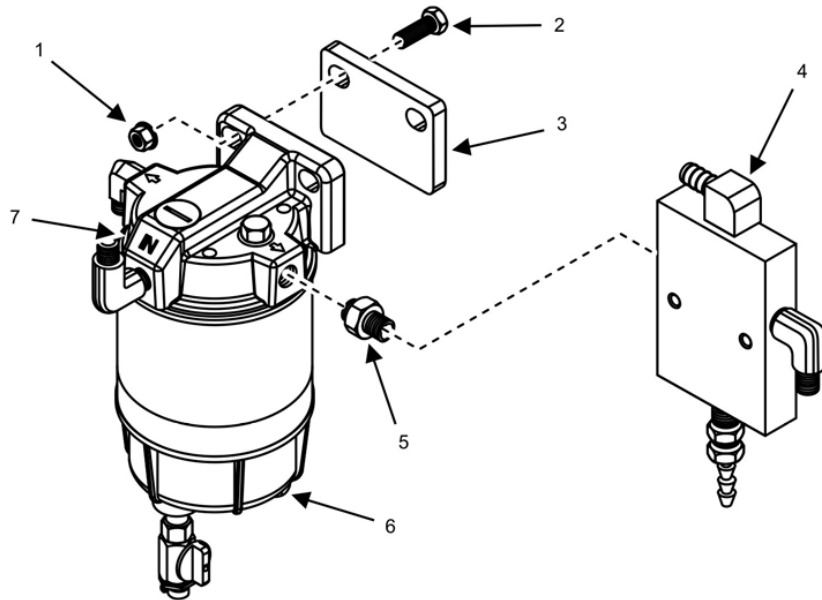
1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate fuel filter/water separator assembly (Figure 1) through right-side door.

REMOVE/INSTALL FUEL FILTER/WATER SEPARATOR ASSEMBLY – CONTINUED

**Figure 2. Fuel Filter/Water Separator - Detail.**

3. Place suitable container and wiping rag under fuel filter/water separator assembly (Figure 3, Item 7) and fuel manifold (Figure 3, Item 4) to catch spilled fuel.
4. Open drain valve (Figure 2, Item 14) on bottom of water bowl (Figure 3, Item 6).
5. Allow fuel to drain into container until flow stops.
6. Close fuel drain valve (Figure 2, Item 14).
7. Remove dirt and debris from fuel filter/water separator head (Figure 2, Item 2) to prevent contamination of fuel system.

REMOVE/INSTALL FUEL FILTER/WATER SEPARATOR ASSEMBLY – CONTINUED

**Figure 3. Fuel Filter/Water Separator - Removal.**

8. Remove two screws (Figure 3, Item 2) and two nuts (Figure 3, Item 1) securing fuel filter/water separator assembly (Figure 3, Item 7) and spacer (Figure 3, Item 3) to front body panel. Place spacer (Figure 3, Item 3) on suitable work surface.
9. Reposition fuel filter/water separator assembly (Figure 3, Item 7) to gain access to fuel lines to be removed.
10. Loosen hose clamp (Figure 2, Item 13) and remove drain hose (Figure 2, Item 12) from drain valve (Figure 3, Item 14).
11. Disconnect fuel supply line (Figure 2, Item 16) at IN pipe adaptor (Figure 2, Item 15) on fuel filter/water separator head (Figure 2, Item 2). Cap/plug fuel supply line (Figure 2, Item 16) and IN pipe adaptor (Figure 2, Item 15) to prevent dirt and debris from entering fuel system.
12. Inspect fuel supply line (Figure 2, Item 16) for obvious signs of damage and replace as required.
13. Disconnect fuel supply engine line (Figure 2, Item 17) from fuel filter/water separator head (Figure 2, Item 2) pipe adaptor (Figure 2, Item 1). Cap/plug fuel supply engine line (Figure 2, Item 17) and pipe adaptor (Figure 2, Item 1) to prevent dirt and debris from entering fuel system.
14. Inspect fuel supply engine line (Figure 2, Item 17) for cracks and other signs of obvious damage and replace as required.
15. Loosen and slide back hose clamp (Figure 2, Item 4) and remove fuel return engine line (Figure 2, Item 3) from fuel filter/water separator manifold (Figure 3, Item 4) pipe adaptor (Figure 2, Item 5). Cap/plug fuel return engine line (Figure 2, Item 3) and pipe adaptor (Figure 2, Item 5) to prevent dirt and debris from entering fuel system.
16. Inspect fuel return engine line (Figure 2, Item 3) for cracks and other signs of obvious damage and replace as required.

REMOVE/INSTALL FUEL FILTER/WATER SEPARATOR ASSEMBLY – CONTINUED**NOTE**

Winterization kit is optional for AMMPS. Removal of heater hose (Figure 2, Item 11) is only necessary if winterization kit is installed in unit.

17. Loosen and slide clamp (Figure 2, Item 10) on heater hose (Figure 2, Item 11) away from manifold joint (Figure 2, Item 9).
18. Remove heater hose (Figure 2, Item 11) from manifold joint (Figure 2, Item 9). Cap/plug heater hose (Figure 2, Item 11) and manifold joint (Figure 2, Item 9) to prevent dirt and debris from entering fuel system.
19. Inspect heater hose (Figure 2, Item 11) and clamps (Figure 2, Item 10) for obvious signs of damage and replace as required.
20. Disconnect fuel return line (Figure 2, Item 8) at pipe adaptor (Figure 2, Item 7). Cap/plug fuel return line (Figure 2, Item 8) and pipe adaptor (Figure 2, Item 7) to prevent dirt and debris from entering fuel system.
21. Inspect fuel return line (Figure 2, Item 8) for obvious signs of damage and replace as required.

NOTE

Removal of fuel filter/water separator manifold (Figure 3, Item 4) may require use of a vice.

22. Disconnect fuel filter/water separator manifold (Figure 3, Item 4) from fuel filter/water separator assembly (Figure 3, Item 7) by loosening pipe nipple (Figure 3, Item 5).

NOTE

If the fuel filter/water separator requires replacement, continue with Steps 23 and 24. Otherwise, continue to Inspect Fuel Filter/Water Separator Assembly task.

23. Remove pipe adaptors (Figure 2, Items 1, 5, and 7), manifold joint (Figure 2, Item 9), reducer (Figure 2, Item 6), and IN pipe adaptor (Figure 2, Item 15) from fuel filter/water separator assembly (Figure 3, Item 7) and fuel filter/water separator manifold (Figure 3, Item 4).
24. Remove pipe nipple (Figure 3, Item 5) that connects fuel filter/water separator assembly (Figure 3, Item 7) to fuel filter/water separator manifold (Figure 3, Item 4).

END OF TASK**Inspect Fuel Filter/Water Separator Assembly**

1. Inspect fuel filter/water separator assembly (Figure 2, Item 7) for obvious signs of damage and replace as required.
2. Inspect pipe adaptors (Figure 2, Items 1, 5, and 7), manifold joint (Figure 2, Item 9), and IN pipe adaptor (Figure 2, Item 15) for obvious signs of damage and replace as required.
3. Inspect fuel filter/water separator manifold (Figure 3, Item 4) for obvious signs of damage and replace as required.
4. Inspect screws (Figure 3, Item 2) and nuts (Figure 3, Item 1) for obvious signs of damage and replace as required.

END OF TASK**Install Fuel Filter/Water Separator Assembly**

1. Replace fuel filter/water separator element prior to installation (WP 0043, Remove/Install Fuel Filter/Water Separator Element).

REMOVE/INSTALL FUEL FILTER/WATER SEPARATOR ASSEMBLY – CONTINUED**NOTE**

Use sealant on all threads of pipe adaptors (Figure 2, Items 1, 5, and 7), manifold joint (Figure 2, Item 9), reducer (Figure 2, Item 6), and IN pipe adaptor (Figure 2, Item 15), and pipe nipple (Figure 3, Item 5). Cure time is 30 min to use fuel system and 72 h for full strength.

2. Apply sealant to pipe adaptors (Figure 2, Items 1, 5, and 7), manifold joint (Figure 2, Item 9), reducer (Figure 2, Item 6), IN pipe adaptor (Figure 2, Item 15), and pipe nipple (Figure 3, Item 5).

NOTE

Continue with Steps 3 through 5 if installation of pipe adaptors (Figure 2, Items 1, 5, and 7), manifold joint (Figure 2, Item 9), reducer (Figure 2, Item 6), IN pipe adaptor (Figure 2, Item 15), and pipe nipple (Figure 3, Item 5) is required. Otherwise, continue to Step 6.

Reassemble fuel filter/water separator assembly (Figure 3, Item 7) and fuel filter/water separator manifold (Figure 3, Item 4) according to Figure 2.

3. Install pipe adaptors (Figure 2, Items 1, 5, and 7), manifold joint (Figure 2, Item 9), reducer (Figure 2, Item 6), IN pipe adaptor (Figure 2, Item 15), and pipe nipple (Figure 3, Item 5) to fuel filter/water separator assembly (Figure 3, Item 7) and fuel filter/water separator manifold (Figure 3, Item 4) 1-1/2 turns past finger-tight, if required.
4. Apply sealant to pipe nipple (Figure 3, Item 5) connecting fuel filter/water separator manifold (Figure 3, Item 4) to fuel filter/water separator assembly (Figure 3, Item 7).
5. Install pipe nipple (Figure 3, Item 5) to fuel filter/water separator assembly (Figure 3, Item 7).
6. Install fuel filter/water separator manifold (Figure 3, Item 4) to fuel filter/water separator assembly (Figure 3, Item 7) at pipe nipple (Figure 3, Item 5).

NOTE

Place a suitable container under fuel filter/water separator assembly to catch spilled fuel. Dispose of captured fuel IAW local SOP.

Remove all caps/plugs from fuel lines/fittings prior to installation of each fuel line.

Wipe down fuel lines, fuel filter/water separator assembly, and fittings with wiping rag prior to installation.

Identification tags should remain in place until the fuel system is completely reassembled and has been tested for proper operation.

7. Connect fuel return line (Figure 2, Item 8) to pipe adaptor (Figure 2, Item 7). Torque line to 195-212 in•lb (22-24 N•m).
8. Connect fuel supply line (Figure 2, Item 16) at IN pipe adaptor (Figure 2, Item 15) on fuel filter/water separator head (Figure 2, Item 2). Torque supply line to 150-159 in•lb (17-18 N•m).
9. Connect fuel supply engine line (Figure 2, Item 17) to pipe adaptor (Figure 2, Item 1). Torque line to 150-159 in•lb (17-18 N•m).
10. Install fuel return engine line (Figure 2, Item 3) and hose clamp (Figure 2, Item 4) to pipe adaptor (Figure 2, Item 5).
11. Tighten hose clamp (Figure 2, Item 4) over fuel return engine line (Figure 2, Item 3) and pipe adapter (Figure 2, Item 5).

REMOVE/INSTALL FUEL FILTER/WATER SEPARATOR ASSEMBLY – CONTINUED**NOTE**

Winterization kit is optional for AMMPS. Installation of heater hose (Figure 2, Item 11) is only necessary if winterization kit is installed in unit.

12. Install heater hose (Figure 2, Item 11) to manifold joint (Figure 2, Item 9).
13. Slide and position one clamp (Figure 2, Item 10) on heater hose (Figure 2, Item 11) at manifold joint (Figure 2, Item 9).
14. Secure clamp (Figure 2, Item 10) over heater hose (Figure 2, Item 11) and manifold joint (Figure 2, Item 9).
15. Install drain hose (Figure 2, Item 12) to drain valve (Figure 3, Item 14) and secure hose clamp (Figure 2, Item 13).
16. Position fuel filter/water separator assembly (Figure 3, Item 7) and fuel filter/water separator manifold (Figure 3, Item 4) to mounting location on front body panel.
17. Secure fuel filter/water separator assembly (Figure 3, Item 7) to front body panel with two screws (Figure 3, Item 2) and two nuts (Figure 3, Item 1).
18. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
19. Close generator set doors.
20. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
21. Start engine and check for proper operation. Bring coolant to normal operating temperature and then apply a 100% rated load for 30 min (TM 9-6115-749-10).
22. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**REMOVE/INSTALL FUEL FILTER/WATER SEPARATOR ELEMENT**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
Wrench, Oil Filter, Strap (WP 0162, Table 2, Item 39)

Personnel Required

91D (1)

References

WP 0039, Service Fuel System

Materials/Parts

Filter, element (1) (WP 0111, Item 7)
Fuel, diesel (WP 0163, Table 1, Item 19)
Grease, electrically conductive (WP 0163, Table 1, Item 20)
Pan, drain (WP 0163, Table 1, Item 28)
Rag, wiping (WP 0163, Table 1, Item 31)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)

REMOVE/INSTALL FUEL FILTER/WATER SEPARATOR ELEMENT**WARNING**

Fuel is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash skin and change clothing promptly if in contact with fuel. Failure to comply may cause injury or death to personnel.

WARNING

Fuels used in the generator set are combustible. Do not smoke or use open fire when performing maintenance. Fire and possible explosion may result. Failure to comply may cause injury or death to personnel and damage to equipment.

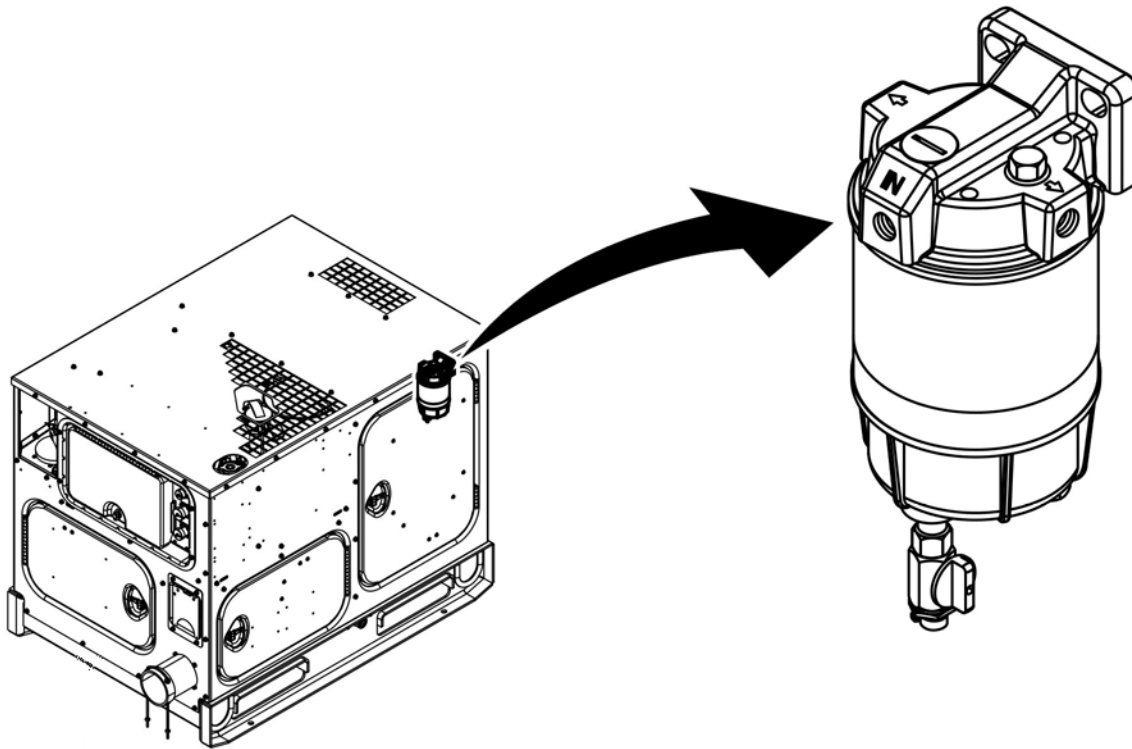
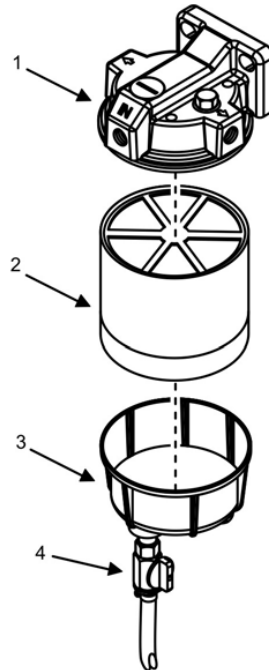
REMOVE/INSTALL FUEL FILTER/WATER SEPARATOR ELEMENT – CONTINUED**Remove Fuel Filter/Water Separator Element**

Figure 1. Fuel Filter/Water Separator - Location.

NOTE

Capture spilled fuel and dispose of with IAW local SOP. Cap/plug all open fuel lines/fittings to prevent dirt and debris from entering the fuel system.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate fuel filter/water separator element (Figure 1) attached to fuel filter/water separator head on front panel next to right-side door.

REMOVE/INSTALL FUEL FILTER/WATER SEPARATOR ELEMENT – CONTINUED**Figure 2. Fuel Filter/Water Separator - Detail.**

3. Place drain pan and wiping rag under fuel filter/water separator element (Figure 2, Item 2).
4. Remove dirt and debris from area around fuel filter/water separator element (Figure 2, Item 2) to prevent contamination.
5. Open drain valve (Figure 2, Item 4) on bottom of water bowl (Figure 2, Item 3).
6. Allow fuel to drain into container until flow stops.
7. Close drain valve (Figure 2, Item 4).
8. Rotate fuel filter/water separator element (Figure 2, Item 2) counterclockwise to remove fuel filter/water separator element (Figure 2, Item 2) from fuel filter/water separator head (Figure 2, Item 1) using oil filter strap wrench.
9. Remove fuel filter/water separator element (Figure 2, Item 2) and gaskets (not shown) from fuel filter/water separator head (Figure 2, Item 1).
10. Remove any remaining gasket residue from fuel filter/water separator head (Figure 2, Item 1) and water bowl (Figure 2, Item 3).
11. Disconnect water bowl (Figure 2, Item 3) from fuel filter/water separator element (Figure 2, Item 2).
12. Inspect water bowl (Figure 2, Item 3) for cracks, leaks, and other signs of obvious damage. Replace as required or set aside for reuse.
13. Discard fuel filter/water separator element (Figure 2, Item 2) and gaskets (not shown) IAW local SOP.
14. Remove dirt and fuel from gasket mating surface at mounting locations on fuel filter/water separator head (Figure 2, Item 1) and water bowl (Figure 2, Item 3).
15. Discard captured fuel and soiled rags IAW local SOP.

END OF TASK

REMOVE/INSTALL FUEL FILTER/WATER SEPARATOR ELEMENT – CONTINUED**Install Fuel Filter/Water Separator Element****NOTE**

Wipe down fuel lines, manifold, and fittings with wiping rag prior to installation.

1. Place drain pan under mounting location for fuel filter/water separator element (Figure 2, Item 2).

NOTE

Element gaskets (not shown) are included with fuel filter/water separator element (Figure 2, Item 2).

2. Apply light film of clean diesel fuel to new fuel filter/water separator element gaskets (not shown).
3. Fill new fuel filter/water separator element (Figure 2, Item 2) to level of the mounting threads with approved diesel fuel.
4. Position new fuel filter/water separator element (Figure 2, Item 2) on fuel filter/water separator head (Figure 2, Item 1).
5. Secure water bowl (Figure 2, Item 3) to bottom of fuel filter/water separator element (Figure 2, Item 2).
6. Rotate fuel filter/water separator element (Figure 2, Item 2) clockwise until gasket makes contact with fuel filter/water separator head (Figure 2, Item 1).
7. Rotate fuel filter/water separator element (Figure 2, Item 2) an additional three-fourths of a turn clockwise to secure.
8. Remove fuel catch container from unit. Dispose of captured fuel IAW local SOP.
9. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
10. Purge fuel system (WP 0039, Service Fuel System).
11. Close generator set doors.
12. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
13. Start engine and check for proper operation. Bring coolant to normal operating temperature and then apply a 100% rated load for 30 min (TM 9-6115-749-10).
14. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

REMOVE/INSTALL FUEL HOSES AND CLAMP BANDS

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Personnel Required

91D (1)
Assistant (1)

Materials/Parts

Line, fuel (1) (WP 0109, Item 22)
 Line, fuel (1) (WP 0109, Item 23)
 Line, fuel (1) (WP 0111, Item 20)
 Line, fuel (1) (WP 0111, Item 21)
 Line, fuel (1) (WP 0111, Item 22)
 Line, fuel (1) (WP 0111, Item 23)
 Tube, flexible (1) (WP 0155, Item 26)
 Cap set, protective (WP 0163, Table 1, Item 8)
 Grease, electrically conductive (WP 0163, Table 1, Item 20)
 Pan, drain (WP 0163, Table 1, Item 28)
 Rag, wiping (WP 0163, Table 1, Item 31)

References

WP 0035, Remove/Install Interior Body Panels
 WP 0039, Service Fuel System

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool
 Battery ground cable removed (WP 0036, Remove/Install Batteries)

REMOVE/INSTALL FUEL HOSES AND CLAMP BANDS**WARNING**

Fuel is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash skin and change clothing promptly if in contact with fuel. Failure to comply may cause injury or death to personnel.

WARNING

Fuels used in the generator set are combustible. Do not smoke or use open fire when performing maintenance. Fire and possible explosion may result. Failure to comply may cause injury or death to personnel and damage to equipment.

NOTE

The unit has numerous fuel lines utilizing two attachment methods. Fuel line assemblies are removed and installed using the same procedure according to their attachment method.

Capture and dispose of spilled fluids IAW local SOP. Cap/plug all open fuel lines/fittings to prevent dirt and debris from entering the fuel system.

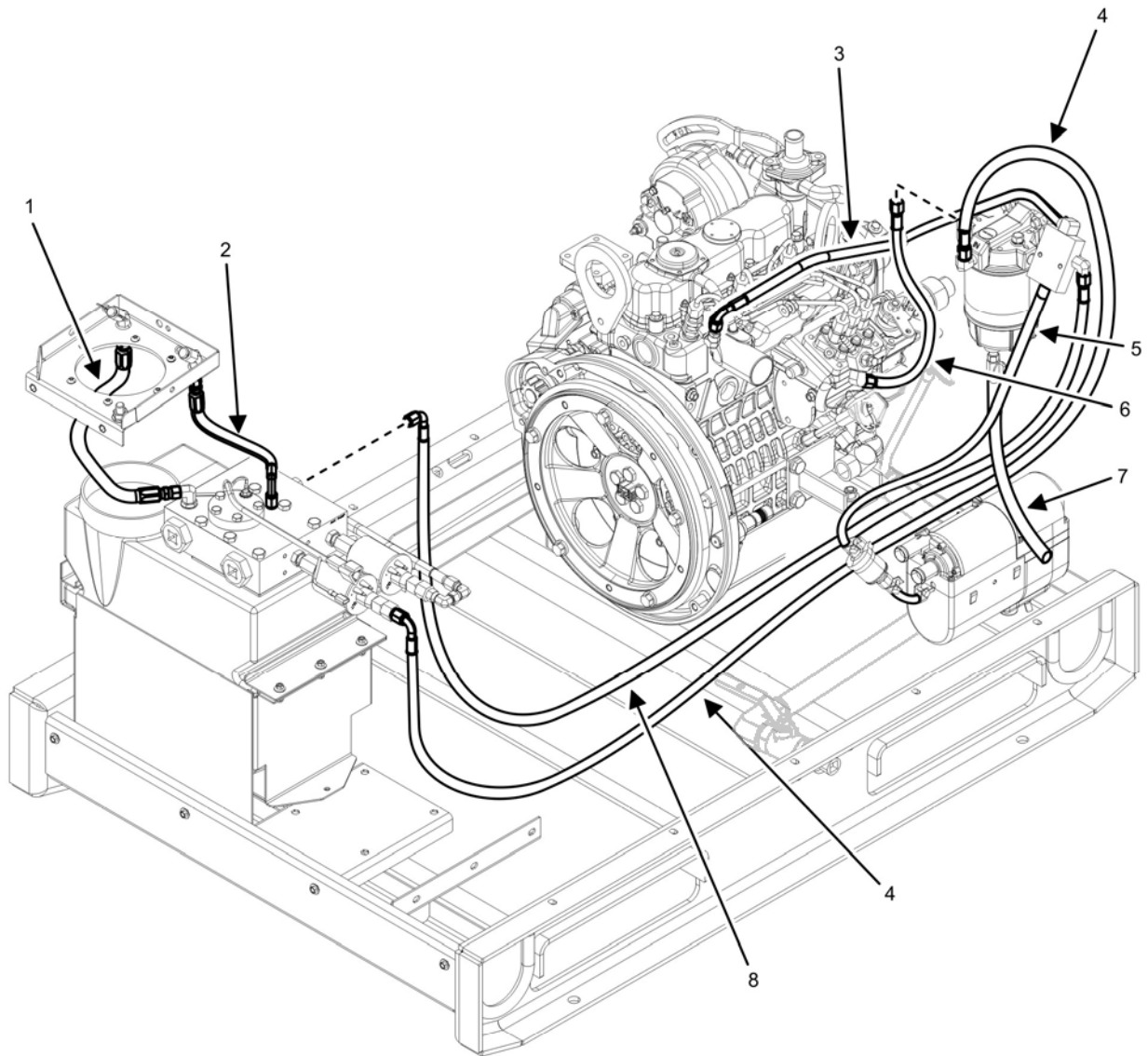
Remove Fuel Hoses with Assembly Attachments**NOTE**

Figure 1 displays the routing of the generator set fuel hoses except for the fuel tank drain valve assembly. Table 1 identifies the name of the fuel hose and the specific equipment conditions required to remove and install the fuel hose.

REMOVE/INSTALL FUEL HOSES AND CLAMP BANDS – CONTINUED**Table 1. Fuel Hoses - Location.**

FIGURE 1 FIND #	HOSE	EQUIPMENT CONDITIONS
1	Auxiliary Fuel Intake Line	Radiator support panel removed (WP 0035, Remove/Install Interior Body Panels.)
2	Auxiliary Fuel Vent Line	Radiator support panel removed (WP 0035, Remove/Install Interior Body Panels.)
3	Fuel Return Engine Line	Right-side door opened
4	Fuel Supply Line	Rear and right-side doors opened
5	Heater Hose	Right-side door opened
6	Fuel Supply Engine Line	Right-side door opened
7	Drain Hose	Right-side door opened
8	Fuel Return Line	Right-side door opened Radiator support panel removed (WP 0035, Remove/Install Interior Body Panels.)

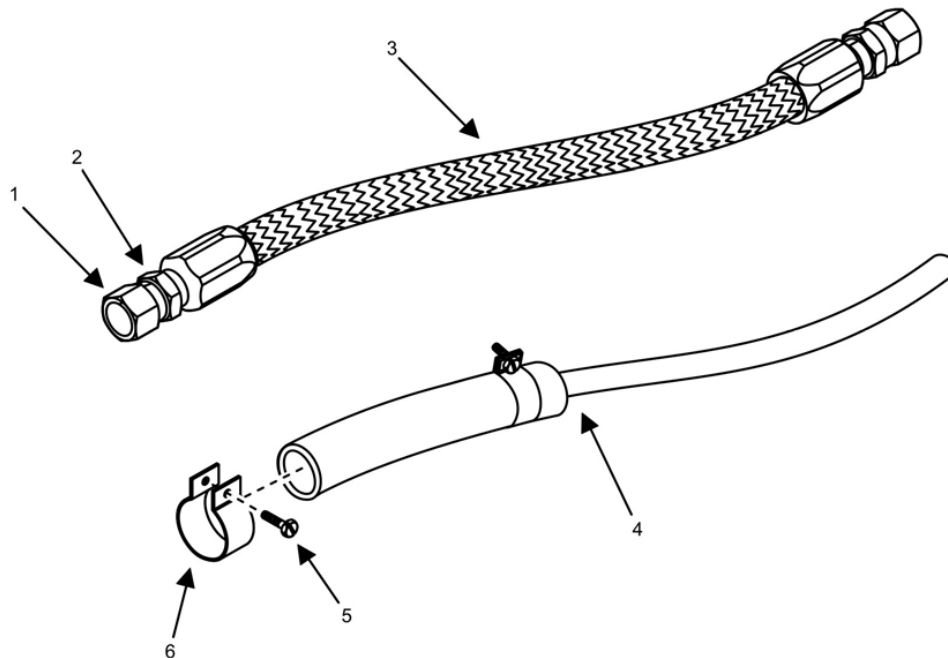
REMOVE/INSTALL FUEL HOSES AND CLAMP BANDS – CONTINUED

**Figure 1. Fuel Hoses - Location.****NOTE**

Unit has numerous fuel lines utilizing two attachment methods. Fuel line assemblies are removed and installed using the same procedure according to their attachment method.

Capture and dispose of spilled fluids IAW local SOP. Cap/plug all open fuel lines/fittings to prevent dirt and debris from entering the fuel system.

1. Ensure equipment conditions are met in order presented in initial setup and Table 1.
2. Locate fuel line to be removed (Figure 1).

REMOVE/INSTALL FUEL HOSES AND CLAMP BANDS – CONTINUED**Figure 2. Fuel Hoses.**

3. Place suitable catch container and wiping rags under fuel line (Figure 2, Item 3) to catch spilled fuel.
4. Place a suitable wrench on fuel line fitting (Figure 2, Item 1) on fuel line (Figure 2, Item 3).
5. Place a suitable wrench on fuel line lock fitting (Figure 2, Item 2).
6. Loosen fuel line fitting (Figure 2, Item 1) from device using wrenches on fuel line fittings (Figure 2, Items 1 and 2).
7. Remove fuel line (Figure 2, Item 3) from device.
8. Repeat Steps 3 through 7 on opposite end of fuel line (Figure 2, Item 3).
9. Remove fuel line (Figure 2, Item 3) from unit.
10. Inspect fuel line (Figure 2, Item 3) for frayed edges, cracks, and other obvious signs of damage and replace as required.

END OF TASK**Install Fuel Hoses with Assembly Attachments****NOTE**

The unit has numerous fuel lines utilizing two attachment methods. Fuel line assemblies are removed and installed using the same procedure according to their attachment method.

Capture and dispose of spilled fluid IAW local SOP. Remove cap/plug from fuel lines/fittings before installation.

Wipe down fuel line, pump, and fittings with wiping rag prior to installation.

1. Place suitable catch container and wiping rag under work area to catch spilled fuel.

REMOVE/INSTALL FUEL HOSES AND CLAMP BANDS – CONTINUED

2. Remove caps/plugs from fuel lines/fittings.
3. Position fuel line fitting (Figure 2, Item 1) onto fixture.
4. Screw fuel line fitting (Figure 2, Item 1) to fixture and finger-tighten.
5. Place a suitable wrench on fuel line fitting (Figure 2, Item 1).
6. Place a suitable wrench on fuel line lock fitting (Figure 2, Item 2).
7. Tighten fuel line fitting (Figure 2, Item 1) on device.
8. Repeat Steps 1 through 7 on opposite end of fuel line.
9. Remove fuel catch container from unit.
10. Install radiator support panel if removed (WP 0035, Remove/Install Interior Body Panels).
11. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
12. Purge fuel system (WP 0039, Service Fuel System).
13. Close all generator set doors.
14. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
15. Start engine and check for proper operation. Bring coolant to normal operating temperature and then apply a 100% rated load for 30 min (TM 9-6115-749-10).
16. Repair as required.

END OF TASK**Remove Fuel Hose with Clamp Bands****NOTE**

The unit has numerous fuel lines utilizing two attachment methods. Fuel line assemblies are removed and installed using the same procedure according to their attachment method.

Capture and dispose of spilled fluid IAW local SOP. Cap/plug all open fuel lines/fittings to prevent dirt and debris from entering the fuel system.

Winterization kit is optional for AMMPs. Removal of heater fuel hose is only necessary if winterization kit is installed in unit.

1. Ensure equipment conditions are met in order presented in initial setup and Table 1.
2. Locate fuel line or hose (Figure 1).
3. Place suitable catch container and wiping rag under work area to catch spilled fuel.
4. Loosen screw (Figure 2, Item 5).
5. Slide clamp band (Figure 2, Item 6) away from fitting.
6. Remove fuel line or hose (Figure 2, Item 4) from fitting.
7. Repeat Steps 3 through 6 on opposite end of fuel hose assembly.
8. Remove fuel line or hose (Figure 2, Item 4) from unit.
9. Inspect clamp bands (Figure 2, Item 6) for excessive corrosion and other signs of obvious damage and replace as required.
10. Inspect fuel hose (Figure 2, Item 4) for frayed edges, cracks, and other obvious signs of damage and replace as required.

END OF TASK

REMOVE/INSTALL FUEL HOSES AND CLAMP BANDS – CONTINUED**Install Fuel Hose with Clamp Bands****NOTE**

The unit has numerous fuel lines utilizing two attachment methods. Fuel line assemblies are removed and installed using the same procedure according to their attachment method.

Capture and dispose of spilled fluid IAW local SOP. Capture and dispose of spilled fluid IAW local SOP.

Wipe down hose, parts, and connectors with wiping rag prior to installation.

Winterization kit is optional for AMMPS. Installation of heater fuel hose is only necessary if winterization kit is installed in unit.

1. Place suitable catch container under work area to catch spilled fuel.
2. Install fuel line or hose (Figure 2, Item 4) to fitting.
3. Slide and position clamp band (Figure 2, Item 6) on fuel hose (Figure 2, Item 4).
4. Tighten clamp band screw (Figure 2, Item 5) over fuel line or hose (Figure 2, Item 4) and fitting.
5. Repeat Steps 1 through 4 on opposite end of fuel hose assembly.
6. Remove fuel catch container from unit.
7. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
8. Purge fuel system (WP 0039, Service Fuel System).
9. Close all generator set doors.
10. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
11. Start engine and check for proper operation. Bring coolant to normal operating temperature and then apply a 100% rated load for 30 min (TM 9-6115-749-10).
12. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

REMOVE/INSTALL FUEL LEVEL SENSOR

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Personnel Required

91D (1)
Assistant (1)

Materials/Parts

Seal, O-ring (WP 0110, Item 2)
Washer, lock 1/4 external tooth (WP 0109, Item 16)
Sensor, fuel level (WP 0110, Item 3)
Cap set, protective (WP 0163, Table 1, Item 8)
Cleaning compound, solvent (WP 0163, Table 1, Item 10)
Fuel, diesel (WP 0163, Table 1, Item 19)
Grease, electrically conductive (WP 0163, Table 1, Item 20)
Pan, drain (WP 0163, Table 1, Item 28)
Primer, sealing compound (WP 0163, Table 1, Item 30)
Rag, wiping (WP 0163, Table 1, Item 31)
Sealant (WP 0163, Table 1, Item 32)

References

WP 0039, Service Fuel System

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)
Radiator support panel removed (WP 0035, Remove/Install Interior Body Panels)

REMOVE/INSTALL FUEL LEVEL SENSOR**WARNING**

Fuel is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash skin and change clothing promptly if in contact with fuel. Failure to comply may cause injury or death to personnel.

WARNING

Fuels used in the generator set are combustible. Do not smoke or use open fire when performing maintenance. Fire and possible explosion may result. Failure to comply may cause injury or death to personnel and damage to equipment.

WARNING

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

NOTE

Capture and dispose of spilled fuel IAW local SOP. Cap/plug all openings to prevent dirt and debris from entering the fuel system.

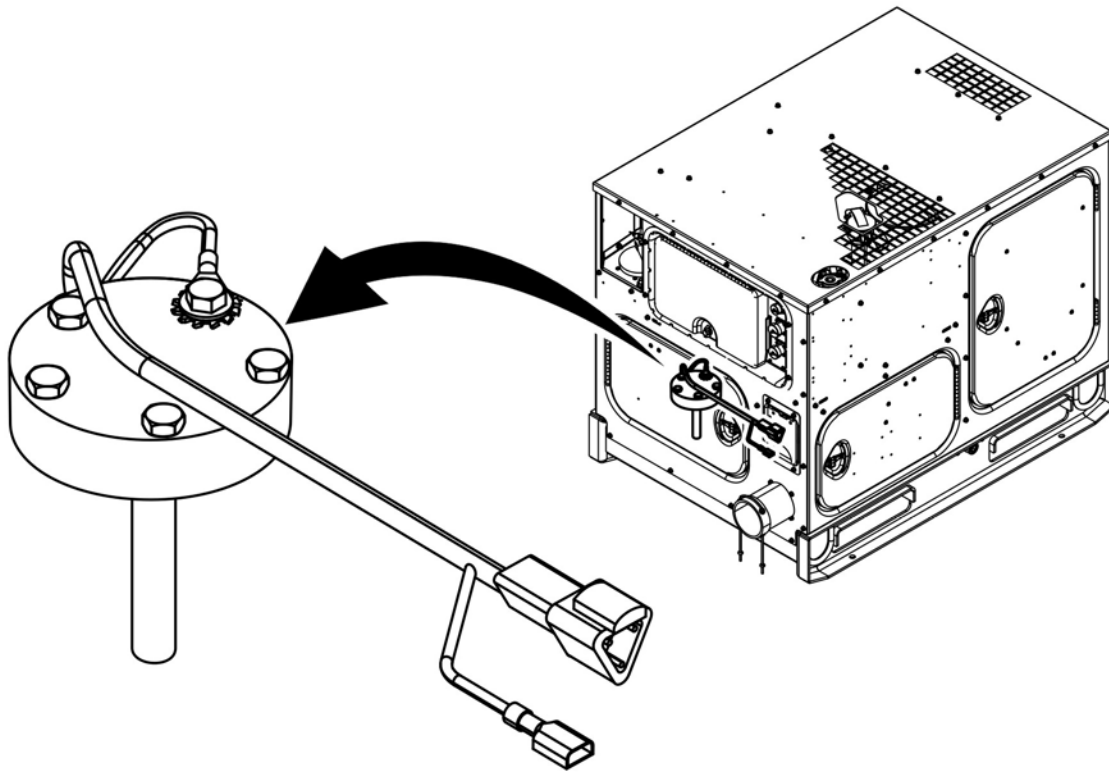
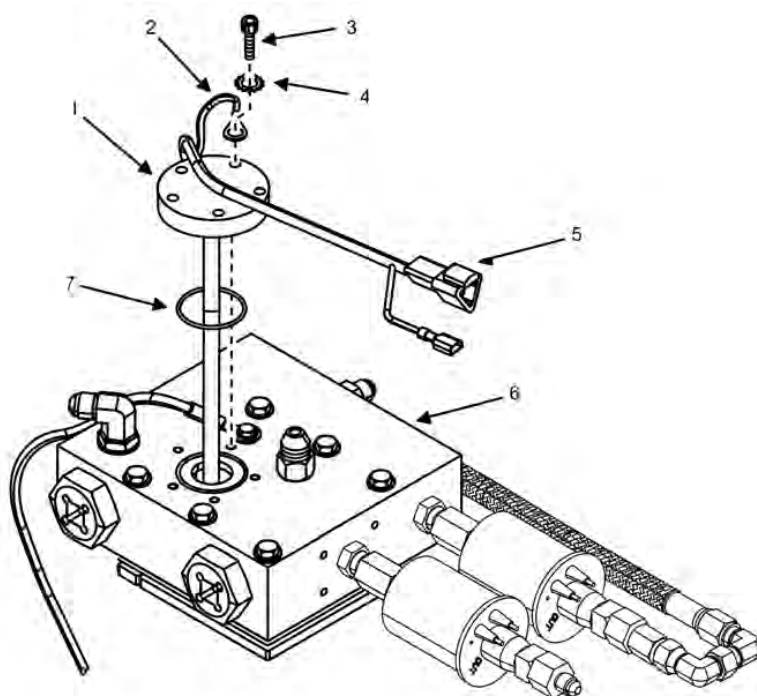
REMOVE/INSTALL FUEL LEVEL SENSOR – CONTINUED**Remove Fuel Level Sensor**

Figure 1. Fuel Level Sensor - Location.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate fuel level sensor (Figure 1) on top of fuel tank manifold (Figure 2, Item 6).
3. Disconnect fuel level sensor electrical lead (Figure 2, Item 5) from wiring harness (not shown).
4. Remove dirt and debris from around fuel level sensor (Figure 2, Item 1).
5. Remove five machine screws (Figure 2, Item 3) and one external tooth lockwasher (Figure 2, Item 4) securing fuel level sensor (Figure 2, Item 1) to top of fuel tank manifold (Figure 2, Item 6).

REMOVE/INSTALL FUEL LEVEL SENSOR – CONTINUED**Figure 2. Fuel Level Sensor - Detail.****NOTE**

Use care during removal to prevent loss of any parts, such as the fuel level sensor (Figure 2, Item 1) and O-ring (Figure 2, Item 7).

Note orientation of fuel level sensor (Figure 2, Item 1) prior to removal to aid in installation.

6. Remove fuel level sensor (Figure 2, Item 1) and O-ring (Figure 2, Item 7) from fuel tank manifold (Figure 2, Item 6). Discard O-ring (Figure 2, Item 7).

WARNING

Compound cleaning solvent is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection is required. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply may cause injury or death to personnel.

7. Clean fuel tank manifold (Figure 2, Item 6) of O-ring residue using compound cleaning solvent and wiping rag.
8. Cover fuel tank manifold (Figure 2, Item 6) opening to prevent dirt and debris from entering fuel system.

END OF TASK**Inspect Fuel Level Sensor**

1. Inspect fuel level sensor (Figure 2, Item 1) for cracks and other signs of obvious damage. Replace as required.

REMOVE/INSTALL FUEL LEVEL SENSOR – CONTINUED

2. Inspect fuel level sensor electrical lead (Figure 2, Item 6) for cut/broken wire or worn insulation. Replace fuel level sensor (Figure 2, Item 1) if wires are cut or broken or if insulation is excessively worn.

END OF TASK**Install Fuel Level Sensor****NOTE**

Wipe down fuel level sensor (Figure 2, Item 1) and fuel tank manifold (Figure 2, Item 6) with wiping rag prior to installation.

1. Remove all dirt, debris, and old O-ring residue from fuel level sensor (Figure 2, Item 1) mounting area on fuel tank manifold (Figure 2, Item 6).
2. Lubricate new O-ring (Figure 2, Item 7) with clean diesel fuel and install to fuel tank manifold (Figure 2, Item 6).

NOTE

Apply a thin coat of electrically conductive grease to mounting surface between fuel tank manifold (Figure 2, Item 6) and fuel level sensor (Figure 2, Item 1).

3. Position fuel level sensor (Figure 2, Item 1) on fuel tank manifold (Figure 2, Item 6) in proper orientation.

NOTE

Follow all manufacturer instructions for sealing compound primer application.

4. Apply sealing compound primer to five machine screws (Figure 2, Item 3).

NOTE

One of the five machine screws (Figure 2, Item 3) also secures ground wire (Figure 2, Item 2) with external tooth lockwasher (Figure 2, Item 4).

5. Install five machine screws (Figure 2, Item 3), one external tooth lockwasher (Figure 2, Item 4), and ground wire (Figure 2, Item 2).
6. Connect fuel level sensor electrical lead (Figure 2, Item 5) to unit wiring harness at connector (not shown).
7. Torque screws to 11-13 in•lb (1 N•m).
8. Install radiator support panel (WP 0035, Remove/Install Interior Body Panels).
9. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
10. Purge fuel system (WP 0039, Service Fuel System).
11. Dispose of spilled fuel IAW local SOP.
12. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
13. Start engine and check for proper operation (TM 9-6115-749-10).
14. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

REMOVE/INSTALL FUEL TANK

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
 Wrench, Torque, Click, Ratcheting, 3/8 in Drive, 75 ft•lb (WP 0162, Table 2, Item 41)
 Wrench, Torque, Dial, 3/8 in Drive, 300 in•lb (WP 0162, Table 2, Item 43)

Materials/Parts

Fitting, bulkhead, 1/4-18 NPT port (WP 0109, Item 37)
 Gasket, fuel system (1) (WP 0109, Item 49)
 Tank, fuel 5 kW (WP 0109, Item 36)
 Alcohol, denatured (WP 0163, Table 1, Item 1)
 Cap set, protective (WP 0163, Table 1, Item 8)
 Detergent, general purpose (WP 0163, Table 1, Item 16)
 Fuel, diesel (WP 0163, Table 1, Item 19)
 Pan, drain (WP 0163, Table 1, Item 28)
 Rag, wiping (WP 0163, Table 1, Item 31)
 Sealant (WP 0163, Table 1, Item 32)

Personnel Required

91D (1)
 Assistant (1)

Equipment Condition

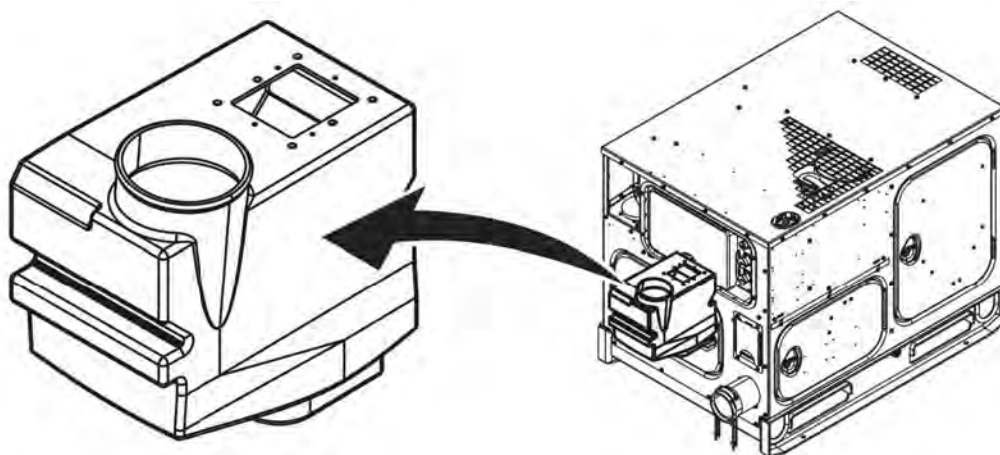
Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool
 Battery ground cable removed (WP 0036, Remove/Install Batteries)
 Drained fuel tank (WP 0039, Service Fuel System)
 Fuel tank filler neck removed (WP 0048, Remove/Install Fuel Tank Filler Neck)
 Radiator support panel removed (WP 0035, Remove/Install Interior Body Panels)
 Fuel manifold removed (WP 0040, Remove/Install Fuel Manifold)

REMOVE/INSTALL FUEL TANK**WARNING**

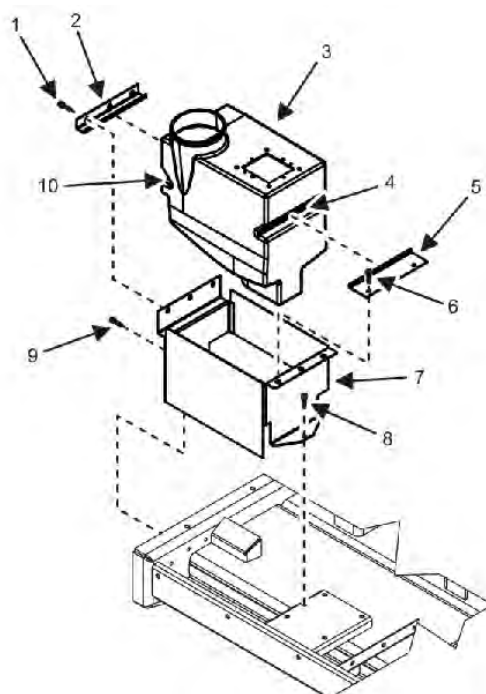
Fuel is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash skin and change clothing promptly if in contact with fuel. Failure to comply may cause injury or death to personnel.

WARNING

Fuels used in the generator set are combustible. Do not smoke or use open fire when performing maintenance. Fire and possible explosion may result. Failure to comply may cause injury or death to personnel and damage to equipment.

REMOVE/INSTALL FUEL TANK – CONTINUED**Remove Fuel Tank****Figure 1. Fuel Tank - Location.**

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate fuel tank (Figure 1).

**Figure 2. Fuel Tank Mounting Brackets.**

REMOVE/INSTALL FUEL TANK – CONTINUED**NOTE**

Capture spilled fuel and dispose of IAW local SOP. Cap/plug all open fuel lines/fittings to prevent dirt and debris from entering the fuel system.

3. Locate mounting brackets (Figure 2, Items 2 and 5) on left- and right-sides of fuel tank (Figure 2, Item 3) that secure fuel tank to fuel tank support (Figure 2, Item 7).
4. Remove three hex flange screws (Figure 2, Item 1) from left-side mounting bracket (Figure 2, Item 2).
5. Remove three hex flange screws (Figure 2, Item 6) from right-side mounting bracket (Figure 2, Item 5).
6. Remove mounting brackets (Figure 2, Items 2 and 5) and save for reuse.
7. Inspect mounting brackets (Figure 2, Items 2 and 5) and hardware for damage, and replace as required.
8. Remove three screws (Figure 2, Item 9) that attach fuel tank support (Figure 2, Item 7) to unit skid.
9. Remove screw (Figure 2, Item 8) that secures fuel tank support (Figure 2, Item 7) to relay panel mount.
10. Lift fuel tank (Figure 3, Item 1) and fuel tank support (Figure 3, Item 2) to gain access to bulkhead fitting (Figure 3, Item 5) and elbow (Figure 3, Item 3) of fuel drain line assembly.
11. Ensure drain ball valve (Figure 3, Item 4) is closed.
12. Remove elbow (Figure 3, Item 3) from bulkhead fitting (Figure 3, Item 5).
13. Remove fuel tank (Figure 3, Item 1) and fuel tank support (Figure 3, Item 2) from unit.
14. Remove fuel tank (Figure 3, Item 1) from fuel tank support (Figure 3, Item 2) and place on suitable work surface.

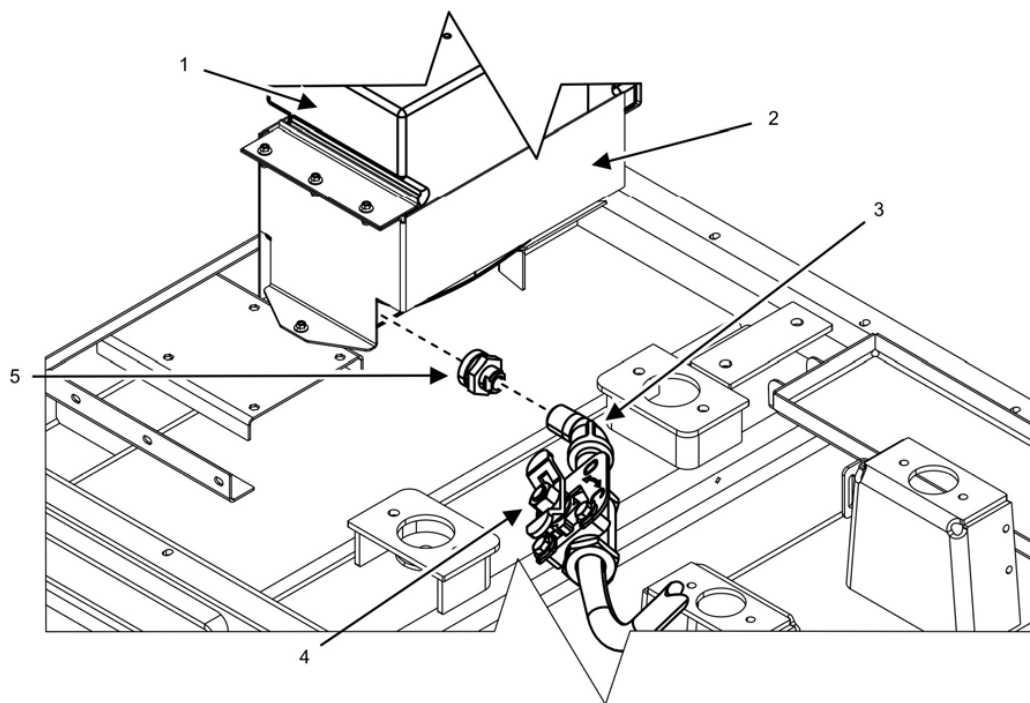


Figure 3. Fuel Tank Drain Line.

REMOVE/INSTALL FUEL TANK – CONTINUED**NOTE**

Bulkhead fitting (Figure 3, Item 5) is left-handed threaded.

15. Remove bulkhead fitting (Figure 3, Item 5) (left-handed thread) from fuel tank (Figure 3, Item 1) and discard.
16. Inspect fuel tank support (Figure 3, Item 2) for damage and replace as required.

END OF TASK**Inspect Fuel Tank**

1. Inspect fuel tank (Figure 3, Item 1) for damage, leaks, or cracks.
2. Replace fuel tank (Figure 3, Item 1) if damaged, leaking, or cracked.

END OF TASK**Clean Fuel Tank**

1. Place suitable container under the fuel tank (Figure 4, Item 2).
2. Cap/plug fuel tank outlet (Figure 4, Item 3).
3. Drain any residual fuel.
4. Fill the fuel tank (Figure 4, Item 2) to three-fourths capacity with solution of 16 oz (473 mL) general purpose detergent and 1 gal (3.8 L) water through the fuel filler neck opening (Figure 4, Item 1).
5. Agitate fuel tank (Figure 4, Item 2) manually for 10 min.

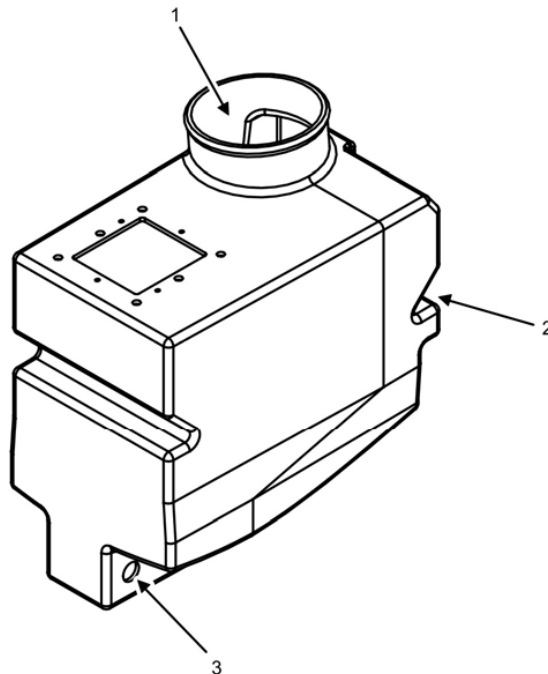


Figure 4. Clean Fuel Tank.

6. Turn fuel tank (Figure 4, Item 2) upside down and drain solution through fuel filler neck opening (Figure 4, Item 1).

REMOVE/INSTALL FUEL TANK – CONTINUED

7. Fill fuel tank (Figure 4, Item 2) to three-fourths full capacity with clean water through fuel filler neck opening (Figure 4, Item 1).
8. Agitate fuel tank (Figure 4, Item 2) manually for 10 min.
9. Turn fuel tank (Figure 4, Item 2) upside down and drain water through fuel filler neck opening (Figure 4, Item 1).
10. Pour 16 oz denatured alcohol into fuel tank (Figure 4, Item 2) through fuel filler neck opening (Figure 4, Item 1).
11. Distribute alcohol over interior of fuel tank (Figure 4, Item 2) by manual rotation.
12. Remove cap/plug from fuel tank outlet (Figure 4, Item 3).
13. Drain any remaining alcohol through fuel tank outlet (Figure 4, Item 3).
14. Allow fuel tank (Figure 4, Item 2) to dry for 2 h.

END OF TASK**Install Fuel Tank****NOTE**

Wipe down lines, parts, and fittings with wiping rag prior to installation.

1. Install new bulkhead fitting (Figure 3, Item 5) to fuel tank (Figure 3, Item 1).
2. Secure bulkhead fitting (Figure 3, Item 5). Torque to 35-44 in•lb (4-5 N•m).
3. Position fuel tank (Figure 3, Item 1) in fuel tank support (Figure 3, Item 2).

NOTE

Thread pipe sealant must cure for 30 min before exposure to fuel and 72 h for full strength.

4. Apply sealant to both threads of elbow (Figure 3, Item 3).
5. Install elbow (Figure 3, Item 3) of fuel drain line assembly to bulkhead fitting (Figure 3, Item 5).
6. Position fuel tank (Figure 3, Item 1) and fuel tank support (Figure 3, Item 2) to mounting location in unit.
7. Install three screws (Figure 2, Item 9) that secure fuel tank support (Figure 2, Item 7) to unit skid.
8. Install screw (Figure 2, Item 8) that secures fuel tank support (Figure 2, Item 7) to relay panel mount.
9. Position left-side mounting bracket (Figure 2, Item 2) to left-side fuel tank (Figure 2, Item 10).
10. Install three hex flange screws (Figure 2, Item 1) to left-side mounting bracket (Figure 2, Item 2). Torque screws to 86-106 in•lb (10-12 N•m).
11. Position right-side mounting bracket (Figure 2, Item 5) on right-side fuel tank (Figure 2, Item 4).
12. Install three hex flange screws (Figure 2, Item 6) to right-side mounting bracket (Figure 2, Item 5). Torque screws to 86-106 in•lb (10-12 N•m).
13. Install fuel manifold (WP 0040, Remove/Install Fuel Manifold).
14. Install fuel tank filler neck (WP 0048, Remove/Install Fuel Tank Filler Neck).
15. Install radiator support panel (WP 0035, Remove/Install Interior Body Panels).
16. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).

NOTE

To close drain ball valve (Figure 3, Item 4), rotate valve handle one-fourth turn so the handle aligns with drain line.

17. Ensure that drain ball valve (Figure 3, Item 4) is closed.

REMOVE/INSTALL FUEL TANK – CONTINUED**WARNING**

Fuels used in the generator set are combustible. Ensure fuel source grounding strap is connected to unit fuel fill grounding stud (fuel fill static ground). When filling the fuel tank, maintain metal-to-metal contact between filler nozzle and fuel tank opening to eliminate **ESD**. Fire and possible explosion can result. Failure to comply may cause injury or death to personnel.

18. After pipe thread sealant has cured, add a small amount of fuel to fuel tank (Figure 3, Item 1) for test.
19. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).

WARNING

Hearing protection is required during maintenance or repair with engine running. Failure to comply can cause hearing loss.

CAUTION

Operating generator set with doors open or with panels removed for an extended length of time will cause engine to overheat. Do not operate generator with doors open or panels removed for longer than necessary to complete your task. Monitor DCS temperature indicator to prevent engine overheating. Failure to comply will cause damage to equipment.

20. Start engine and check for fuel leaks and proper operation. Bring coolant to normal operating temperature and then apply a 100% rated load for 30 min (TM 9-6115-749-10).
21. Stop engine, repair any leaks, then start engine again to check leak repairs. Repeat as needed until all leaks have been repaired.
22. Close generator set doors.
23. Fill fuel tank to proper level (WP 0039, Service Fuel System).
24. Purge fuel system (WP 0039, Service Fuel System).
25. Dispose of captured fuel and soiled cleaning rags IAW local SOP.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

REMOVE/INSTALL FUEL TANK DRAIN VALVE ASSEMBLY

INITIAL SETUP:

Tools and Special Tools

Crowfoot Attachment Set, Socket Wrench, Flare Nut, Standard (WP 0162, Table 2, Item 13)
 Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
 Wrench, Torque, Dial, 3/8 in Drive, 300 in•lb (WP 0162, Table 2, Item 43)

Materials/Parts

Connector, tube bulkhead, 1/2-20 in JIC flare (WP 0109, Item 42)
 Elbow pipe (1) (WP 0109, Item 38)
 Fitting bulkhead, 1/4-18 NPT port (1) (WP 0109, Item 37)
 Fitting, pipe nipple 1/4 in NPT x 38.1 mm long (1) (WP 0109, Item 39)
 Elbow 1/4-NPT x 1/2-20 (1) (WP 0109, Item 41)
 Line, fuel (1) (WP 0109, Item 43)
 Valve, ball 1/4 female NPT (1) (WP 0109, Item 40)
 Washer, lock (M6) (2) (WP 0109, Item 45)
 Cap set, protective (WP 0163, Table 1, Item 8)
 Fuel, diesel (WP 0163, Table 1, Item 18)

Materials/Parts - cont'd

Grease, electrically conductive (WP 0163, Table 1, Item 20)
 Pan, drain (WP 0163, Table 1, Item 28)
 Rag, wiping (WP 0163, Table 1, Item 31)
 Sealant (WP 0163, Table 1, Item 32)

Personnel Required

91D (1)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool
 Battery ground cable removed (WP 0036, Remove/Install Batteries)
 Fuel tank removed (WP 0046, Remove/Install Fuel Tank)

REMOVE/INSTALL FUEL TANK DRAIN VALVE ASSEMBLY

WARNING

Fuel is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash skin and change clothing promptly if in contact with fuel. Failure to comply may cause injury or death to personnel.

WARNING

Fuels used in the generator set are combustible. Do not smoke or use open fire when performing maintenance. Fire and possible explosion may result. Failure to comply may cause injury or death to personnel and damage to equipment.

Remove Fuel Tank Drain Valve Assembly

NOTE

Removal of the fuel tank requires the disconnection of the fuel tank drain valve assembly (Figure 1) from the fuel tank at pipe elbow (Figure 2, Item 2) and bulkhead fitting (Figure 2, Item 1). Fuel tank must be removed and disconnected from fuel tank drain valve assembly prior to beginning this task (WP 0046, Remove/Install Fuel Tank).

REMOVE/INSTALL FUEL TANK DRAIN VALVE ASSEMBLY – CONTINUED

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate fuel tank drain valve assembly (Figure 1).

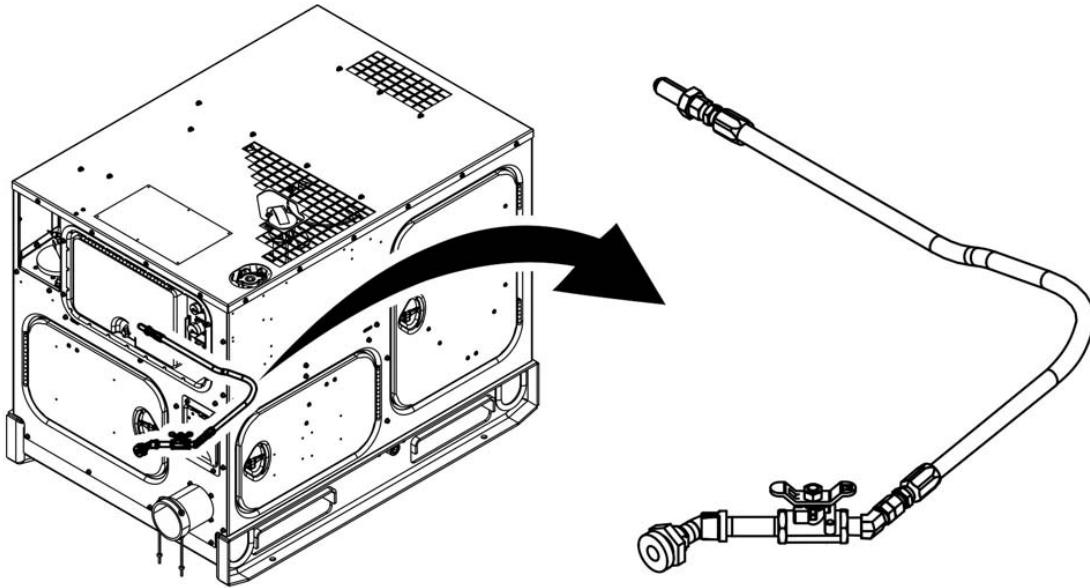


Figure 1. Fuel Tank Drain Valve Assembly - Location.

3. Remove any dirt and debris from around fuel drain outlet (Figure 2, Item 7).

NOTE

Capture and dispose of spilled fuel IAW local SOP. Cap/plug all open fuel lines/fittings to prevent dirt and debris from entering the fuel system.

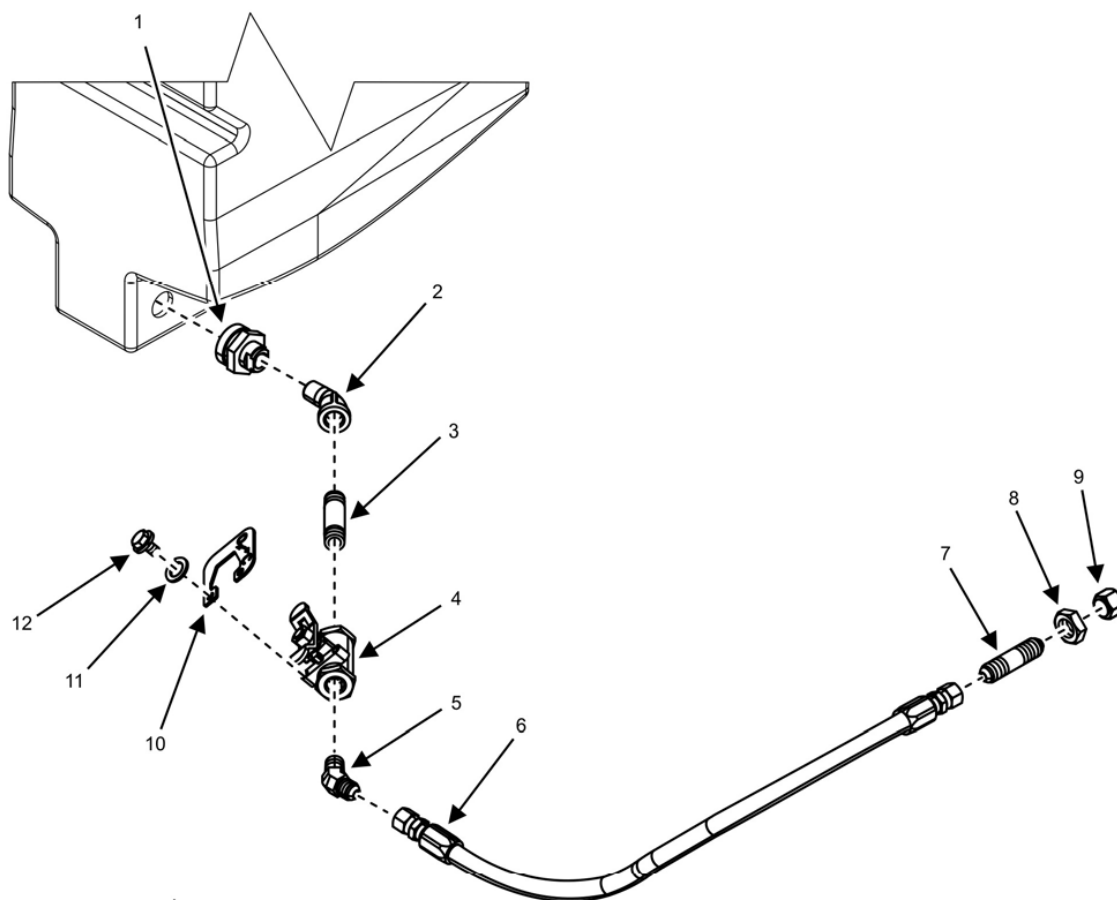
4. Remove fuel drain cap (Figure 2, Item 9) from fuel drain outlet (Figure 2, Item 7).
5. Disconnect fuel drain cap (Figure 2, Item 9) chain (not shown) from flange head screw (not shown) on unit skid.

NOTE

Note orientation of elbow fittings and ball valve before removal to aid in installation.

6. Remove nut (Figure 2, Item 8) securing fuel drain outlet (Figure 2, Item 7) to left-side skid.
7. Remove fuel tank drain valve assembly (Figure 1) from unit and place on suitable work surface.
8. Disconnect fuel drain outlet (Figure 2, Item 7) from fuel line (Figure 2, Item 6).
9. Disconnect fuel line (Figure 2, Item 6) from tube elbow fitting (Figure 2, Item 5).

REMOVE/INSTALL FUEL TANK DRAIN VALVE ASSEMBLY – CONTINUED

Legend

- | | | |
|-----------------------|----------------------|-----------------------|
| 1 Bulkhead Fitting | 5 Tube Elbow Fitting | 9 Fuel Drain Cap |
| 2 Pipe Elbow | 6 Fuel Line | 10 Ball Valve Bracket |
| 3 Pipe Nipple Fitting | 7 Fuel Drain Outlet | 11 Lockwasher |
| 4 Ball Valve | 8 Nut | 12 Screw |

Figure 2. Fuel Tank Drain Valve - Detail.

10. Disconnect tube elbow fitting (Figure 2, Item 5) from ball valve (Figure 2, Item 4).
11. Disconnect ball valve (Figure 2, Item 4) from pipe nipple fitting (Figure 2, Item 3).
12. Disconnect pipe nipple fitting (Figure 2, Item 3) from pipe elbow (Figure 2, Item 2).
13. Remove two screws (Figure 2, Item 12) and two lockwashers (Figure 2, Item 11) securing ball valve bracket (Figure 2, Item 10) to ball valve (Figure 2, Item 4).
14. Discard lockwashers (Figure 2, Item 11).
15. Place fuel drain assembly parts on suitable work surface.

END OF TASK**Inspect Fuel Tank Drain Valve Assembly**

1. Inspect fuel drain outlet (Figure 2, Item 7) for cracks, worn threads, excessive corrosion, and other signs of obvious damage. Replace as required.

REMOVE/INSTALL FUEL TANK DRAIN VALVE ASSEMBLY – CONTINUED

2. Inspect nut (Figure 2, Item 8) for worn threads, excessive corrosion, and other signs of obvious damage. Replace as required.
3. Inspect fuel line (Figure 2, Item 6) for frayed cover, cracks, kinks, and other signs of obvious damage. Replace as required.
4. Inspect tube elbow fitting (Figure 2, Item 5) for worn threads, excessive corrosion, cracks, and other signs of obvious damage. Replace as required.
5. Inspect ball valve (Figure 2, Item 4) for cracks, broken/damaged handle, restricted handle movement, excessive corrosion, and other signs of obvious damage. Replace as required.
6. Inspect pipe nipple fitting (Figure 2, Item 3) for worn threads, excessive corrosion, and other signs of obvious damage. Replace as required.
7. Inspect pipe elbow (Figure 2, Item 2) for worn threads, excessive corrosion, and other signs of obvious damage. Replace as required.
8. Inspect fuel drain cap (Figure 2, Item 9) and chain for cracks, excessive corrosion, and other signs of obvious damage. Replace as required.
9. Inspect bulkhead fitting (Figure 2, Item 1) for worn threads, excessive corrosion, and other signs of obvious damage. Replace as required.

END OF TASK**Install Fuel Tank Drain Valve Assembly****NOTE**

Wipe down fuel line, parts, and fittings with wiping rag prior to installation.

1. Position ball valve bracket (Figure 2, Item 10) over ball valve (Figure 2, Item 4).
2. Secure ball valve bracket (Figure 2, Item 10) to ball valve (Figure 2, Item 4) with two screws (Figure 2, Item 12) and two new lockwashers (Figure 2, Item 11).
3. Install fuel drain outlet (Figure 2, Item 7) to fuel line (Figure 2, Item 6). Torque line to 151-185 in•lb (17-21 N•m).

NOTE

Thread pipe sealant must cure for 30 min before exposure to fuel and 72 h for full strength.

4. Apply sealant to both threads of tube elbow fitting (Figure 2, Item 5).
5. Install tube elbow fitting (Figure 2, Item 5) to fuel line (Figure 2, Item 6). Torque line to 151-185 in•lb (17-21 N•m).
6. Install ball valve (Figure 2, Item 4) to tube elbow fitting (Figure 2, Item 5). Tighten ball valve (Figure 2, Item 4) 1 - 1 1/2 turns past finger-tight.
7. Apply sealant to both threads of pipe nipple fitting (Figure 2, Item 3).
8. Install pipe nipple fitting (Figure 2, Item 3) to ball valve (Figure 2, Item 4). Tighten pipe nipple fitting (Figure 2, Item 3) 1 - 1 1/2 turns past finger-tight.
9. Apply sealant to male threads of pipe elbow (Figure 2, Item 2).
10. Install pipe elbow (Figure 2, Item 2) to pipe nipple fitting (Figure 2, Item 3). Tighten pipe elbow (Figure 2, Item 2) 1 - 1 1/2 turns past finger-tight.
11. Install fuel tank to secure fuel drain assembly to fuel tank (WP 0046, Remove/Install Fuel Tank).

REMOVE/INSTALL FUEL TANK DRAIN VALVE ASSEMBLY – CONTINUED

12. Install fuel drain outlet (Figure 2, Item 7) through unit skid.
13. Secure fuel drain outlet (Figure 2, Item 7) to skid with nut (Figure 2, Item 8).
14. Install fuel drain cap (Figure 2, Item 9) to fuel drain outlet (Figure 2, Item 7).
15. Secure fuel drain cap (Figure 2, Item 9) chain (not shown) to screw (not shown) on left-side of unit skid.
16. Ensure ball valve (Figure 2, Item 4) is in closed position.
17. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
18. Purge fuel system (WP 0039, Service Fuel System).
19. Close generator set doors.
20. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
21. Start engine and check for fuel leaks and proper operation (TM 9-6115-749-10).
22. Repair as required.
23. Dispose of captured fuel and soiled wiping rags IAW local SOP.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE

REMOVE/INSTALL FUEL TANK FILLER NECK

INITIAL SETUP:

Tools and Special Tools

Hammer, Hand, Soft Face, Dead Blow (WP 0162, Table 2, Item 15)
 Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
 Wrench, Torque, Click, Ratcheting, 3/8 in Drive, 75 ft•lb (WP 0162, Table 2, Item 41)
 Wrench, Torque, Dial, 3/8 in Drive, 300 in•lb (WP 0162, Table 2, Item 43)

Materials/Parts

Clamp (2) (WP 0109, Item 20)
 Coupling, hose (WP 0109, Item 21)
 Module, fuel filler neck (WP 0109, Item 24)
 Tube, fuel fill (WP 0109, Item 25)
 Washer, lock 1/4 external tooth (WP 0109, Item 16)
 Washer, lock M10 external tooth (WP 0109, Item 27)
 Cap set, protective (WP 0163, Table 1, Item 8)
 Fuel, diesel (WP 0163, Table 1, Item 19)
 Pan, drain (WP 0163, Table 1, Item 28)

Materials/Parts - cont'd

Rag, wiping (WP 0163, Table 1, Item 31)
 Tag, marker (WP 0163, Table 1, Item 35)

Personnel Required

91D (1)
 Assistant (1)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool
 Battery ground cable removed (WP 0036, Remove/Install Batteries)
 Left-side body panel removed (WP 0031, Remove/Install Left-side Body Panel)
 Rear body panel removed (WP 0030, Remove/Install Rear Body Panel)
 Fuel tank drained to half capacity (WP 0039, Service Fuel System)

REMOVE/INSTALL FUEL FILLER NECK

WARNING

Fuel is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash skin and change clothing promptly if in contact with fuel. Failure to comply may cause injury or death to personnel.

WARNING

Fuels used in the generator set are combustible. Do not smoke or use open fire when performing maintenance. Fire and possible explosion may result. Failure to comply may cause injury or death to personnel and damage to equipment.

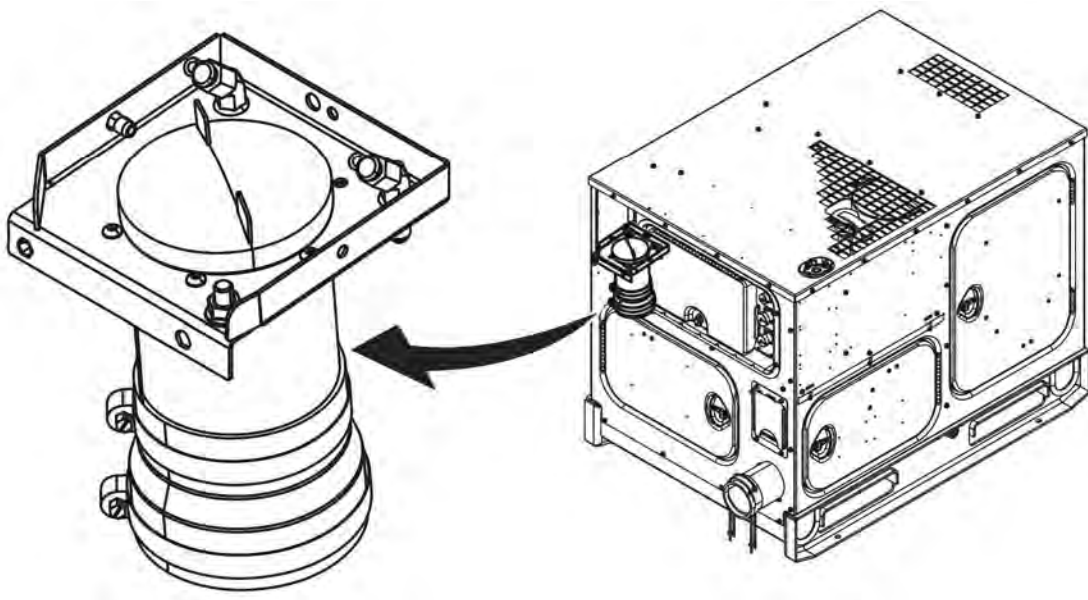
REMOVE/INSTALL FUEL FILLER NECK – CONTINUED**Remove Fuel Filler Neck**

Figure 1. Fuel Tank Filler Neck - Location.

1. Ensure equipment conditions are met in order presented in initial setup.

NOTE

Capture and dispose of spilled fuel IAW local SOP. Cap/plug all open fuel lines/fittings to prevent dirt and debris from entering the fuel system.

Note orientation of fuel cap before removal to aid in installation.

2. Locate fuel filler neck on located on top of fuel tank (Figure 1).

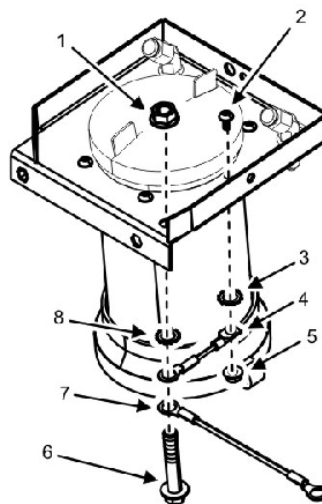


Figure 2. Fuel Filler Neck Ground Cable - Removal.

REMOVE/INSTALL FUEL FILLER NECK – CONTINUED

3. Remove screw (Figure 2, Item 6), external tooth lockwasher (Figure 2, Item 8), and nut (Figure 2, Item 1) that secure ground cables (Figure 2, Items 4 and 7) to fuel system bracket.
4. Discard external tooth lockwasher (Figure 2, Item 8).

NOTE

One of six screws securing fuel filler neck to fuel system bracket also secures ground wire cable to fuel system bracket.

5. Remove capscrew (Figure 2, Item 2), external tooth lockwasher (Figure 2, Item 3), and nut (Figure 2, Item 5) that secure ground cable (Figure 2, Item 4) to fuel system bracket.
6. Discard external tooth lockwasher (Figure 2, Item 3).
7. Inspect ground cables (Figure 2, Items 4 and 7) for damage and replace as required.

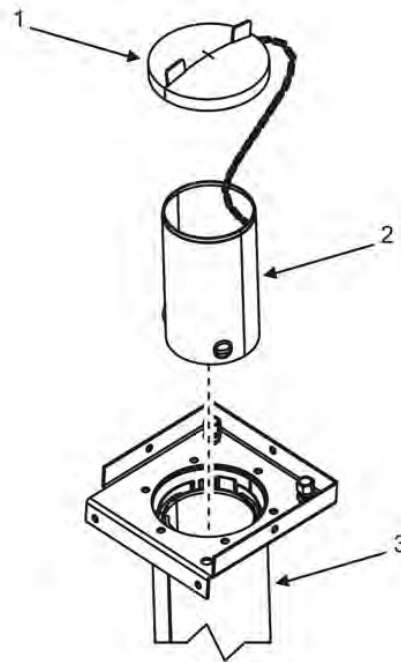


Figure 3. Fuel Filler Cap and Strainer - Removal.

8. Remove fuel filler cap (Figure 3, Item 1) and strainer (Figure 3, Item 2) from fuel filler neck (Figure 3, Item 3).
9. Inspect fuel filler cap (Figure 3, Item 1) and chain for damage. Replace as required or set aside for reuse.
10. Inspect fuel strainer (Figure 3, Item 2) for damage. Replace as required or set aside for reuse.
11. Cover opening in fuel filler neck (Figure 3, Item 3) to prevent dirt and debris from entering fuel system.

NOTE

Two wrenches may be required to disconnect auxiliary fuel lines. Tag and mark lines for proper reinstallation.

12. Disconnect auxiliary fuel intake line (Figure 4, Item 6) from fuel system bracket (Figure 4, Item 2). Cap/plug line to prevent dirt and debris from entering fuel system.
13. Remove two screws (Figure 4, Item 3) securing edges of fuel system bracket (Figure 4, Item 2) to interior panels of generator set.

REMOVE/INSTALL FUEL FILLER NECK – CONTINUED

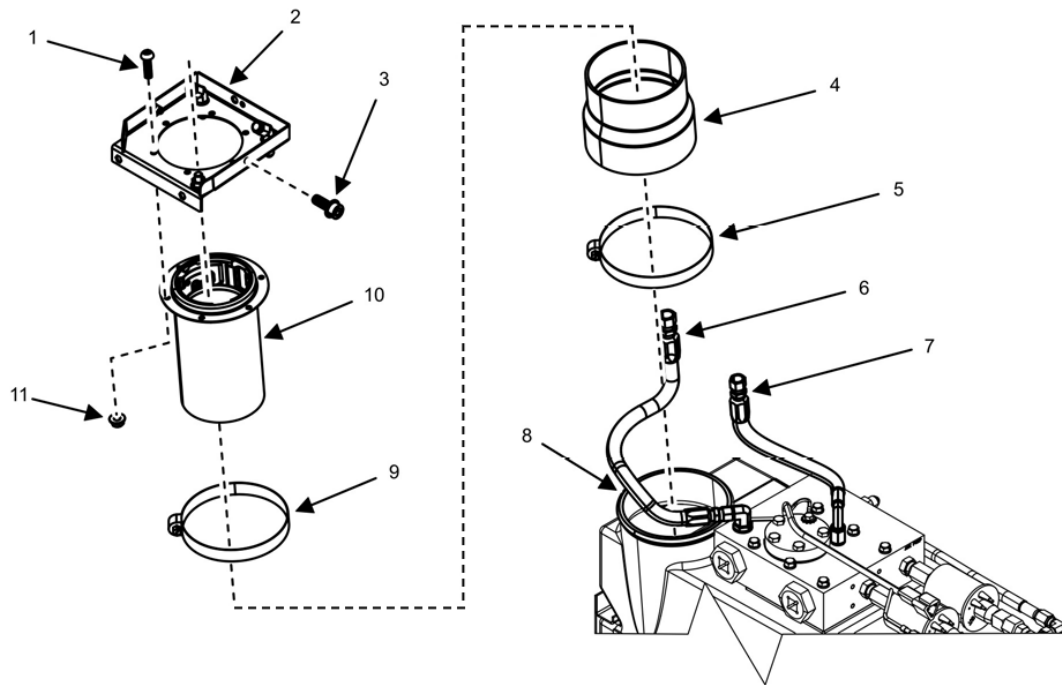


Figure 4. Fuel Tank Filler Neck - Detail.

14. Loosen and slide hose clamps (Figure 4, Items 5 and 9) and hose coupling (Figure 4, Item 4) away from fuel tank opening (Figure 4, Item 8).

NOTE

Fuel filler neck fits snugly over fuel tank opening. Light percussion from a rubber mallet will assist with the removal of filler neck.

15. Reposition fuel filler neck (Figure 4, Item 10) and fuel system bracket (Figure 4, Item 2) to disconnect auxiliary vent line (Figure 4, Item 7) from fuel system bracket (Figure 4, Item 2). Cap/plug line to prevent dirt and debris from entering fuel system.
16. Remove fuel filler neck (Figure 4, Item 10), fuel system bracket (Figure 4, Item 2), hose clamps (Figure 4, Items 5 and 9), and hose coupling (Figure 4, Item 4) from unit and place on a suitable work surface.
17. Cover fuel tank opening (Figure 4, Item 8) to prevent dirt and debris from entering fuel system.
18. Remove hose clamps (Figure 4, Items 5 and 9) and hose coupling (Figure 4, Item 4) from fuel filler neck (Figure 4, Item 10).

NOTE

Chains for auxiliary fuel line caps are secured by two of six capscrews securing fuel system bracket to fuel filler neck. Note location of chains to aid in reinstallation.

19. Remove five capscrews (Figure 4, Item 1) and nuts (Figure 4, Item 11) securing fuel system bracket (Figure 4, Item 2) to fuel filler neck (Figure 4, Item 10) and setscrews aside for reuse.

END OF TASK

REMOVE/INSTALL FUEL FILLER NECK – CONTINUED**Inspect Fuel Filler Neck**

1. Inspect fuel filler neck (Figure 4, Item 10) for splits, cracks, or brittleness. Replace as required.
2. Inspect hose coupling (Figure 4, Item 4) for splits, cracks, or brittleness that would allow fuel to escape. Replace as required.
3. Inspect hose clamps (Figure 4, Items 5 and 9) for damage or corrosion. Replace as required.
4. Inspect fuel system bracket (Figure 4, Item 2) for damage or corrosion. Replace as required.

END OF TASK**Install Fuel Filler Neck****NOTE**

Capture and dispose of spilled fuel IAW local SOP. Remove all caps/plugs and tags from fuel lines/fittings prior to installation of each fuel line.

Wipe down fuel lines, parts, and fittings with wiping rag prior to installation.

1. Position top and bottom hose clamps (Figure 4, Items 5 and 9) to hose coupling (Figure 4, Item 4).
2. Slide hose coupling (Figure 4, Item 4) and hose clamps (Figure 4, Items 5 and 9) onto fuel filler neck (Figure 4, Item 10).

NOTE

Fuel filler neck (Figure 4, Item 10) fits snugly over the fuel tank opening. Light percussion from a rubber mallet will assist with positioning filler neck.

3. Install hose coupling (Figure 4, Item 4) and fuel filler neck (Figure 4, Item 10) assembly to opening at top of fuel tank opening (Figure 4, Item 8).

NOTE

Chains for auxiliary fuel line caps are secured by two of six capscrews securing fuel system bracket to the fuel filler neck. Chains must be secured to same location as removed before tightening capscrews.

One of six capscrews securing fuel filler neck to fuel system bracket also secures ground cable to the fuel system bracket.

4. Install fuel system bracket (Figure 4, Item 2) to fuel filler neck (Figure 4, Item 10) using five capscrews (Figure 4, Item 1) and nuts (Figure 4, Item 11). Torque to 89-106 in•lb (10-12 N•m).
5. Install ground cable (Figure 2, Item 4) to fuel system bracket with capscrew (Figure 2, Item 2), external tooth lockwasher (Figure 2, Item 3), and nut (Figure 2, Item 5). Torque to 89-106 in•lb (10-12 N•m).
6. Connect auxiliary vent line (Figure 4, Item 7) to fuel system bracket (Figure 4, Item 2). Torque to 124-133 in•lb (14-15 N•m).
7. Install two screws (Figure 4, Item 3) to secure edges of fuel system bracket (Figure 4, Item 2) to interior panel of generator set.
8. Install auxiliary fuel intake line (Figure 4, Item 6) to fuel system bracket (Figure 4, Item 2). Torque to 124-133 in•lb (14-15 N•m).
9. Ensure both hose clamps (Figure 4, Items 5 and 9) are in correct position on hose coupling (Figure 4, Item 4).
10. Secure fuel filler neck (Figure 4, Item 10) to fuel tank opening (Figure 4, Item 8) by tightening hose clamps (Figure 4, Items 5 and 9).

REMOVE/INSTALL FUEL FILLER NECK – CONTINUED

11. Install fuel strainer (Figure 3, Item 2).
12. Secure fuel filler cap (Figure 3, Item 1).
13. Secure ground cables (Figure 2, Items 4 and 7) to fuel system bracket by installing screw (Figure 2, Item 6), new external tooth lockwasher (Figure 2, Item 8), and nut (Figure 2, Item 1).
14. Torque nut (Figure 2, Item 1) to 35-42 ft•lb (47-57 N•m).
15. Install left-side body panel (WP 0031, Remove/Install Left-side Body Panel).
16. Install rear body panel from generator set (WP 0030, Remove/Install Rear Body Panel).
17. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
18. Fill fuel tank to proper level (TM 9-6115-749-10).
19. Dispose of captured fuel IAW local SOP.
20. Close generator set doors.
21. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
22. Start engine and check for proper operation (TM 9-6115-749-10).
23. Repair as required.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE

REMOVE/INSTALL 50/60 HZ AC GENERATOR ASSEMBLY

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
 Wrench, Torque, Dial, 1/4 in Drive, 30 in•lb (WP 0162, Table 2, Item 42)
 Wrench, Torque, Dial, 3/8 in Drive, 300 in•lb (WP 0162, Table 2, Item 43)
 Wrench, Torque, Click, Ratcheting, 3/8 in Drive, 75 ft•lb (WP 0162, Table 2, Item 41)

Materials/Parts

Generator assembly, 5 kW, 50/60 Hz (WP 0121, Item 1)
 Isolator, vibration, alternator mount (2) (WP 0120, Item 13)
 Nut, Hexagon (2) (WP 0120, Item 8)
 Washer, lock (4) (WP 0121, Item 20)
 Antifreeze, ethylene glycol (WP 0163, Table 1, Item 2)
 Cap set, protective (WP 0163, Table 1, Item 8)
 Cleaning compound, solvent (WP 0163, Table 1, Item 10)
 Distilled water (WP 0163, Table 1, Item 17)
 Fuel, diesel (WP 0163, Table 1, Item 19)
 Grease, electrically conductive (WP 0163, Table 1, Item 20)
 Pan, drain (WP 0163, Table 1, Item 28)
 Penetrating oil (WP 0163, Table 1, Item 29)
 Rag, wiping (WP 0163, Table 1, Item 31)
 Strap, tiedown (WP 0163, Table 1, Item 34)
 Tag, marker (WP 0163, Table 1, Item 35)

Personnel Required

91D (1)
 Assistant (2)

References

WP 0054, Remove/Install Voltage Selection Switch

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool
 Battery ground cable removed (WP 0036, Remove/Install Batteries)
 Top body panel removed (WP 0028, Remove/Install Top Body Panel)
 DCS removed (WP 0017, Remove/Install DCS)
 Front body panel removed (WP 0029, Remove/Install Front Body Panel)
 Rear body panel removed (WP 0030, Remove/Install Rear Body Panel)
 Right-side body panel removed (WP 0032, Remove/Install Right-side Body Panel)
 Left-side body panel removed (WP 0031, Remove/Install Left-side Body Panel)
 Interior bulkhead panel removed (WP 0035, Remove/Install Interior Body Panels)
 Fuel tank removed (WP 0046, Remove/Install Fuel Tank)
 Starter removed (WP 0077, Remove/Install Starter)
 Engine speed sensor removed (WP 0067, Remove/Install Engine Speed Sensor)
 Relay panel removed (WP 0061, Remove/Install Relay Panel)

REMOVE/INSTALL 50/60 HZ AC GENERATOR ASSEMBLY

WARNING

AC generator assembly weighs approximately 252-262 lb (114-119 kg). Use suitable lifting device with a capacity of at least 1,000 lb (453.6 kg) to lift the weight of the assembly. Do not stand or put arms, legs, or any body part under hoisted load. Failure to comply may cause injury or death to personnel.

REMOVE/INSTALL 50/60 HZ AC GENERATOR ASSEMBLY – CONTINUED**WARNING**

Compound cleaning solvent is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection is required. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply may cause injury or death to personnel.

Remove 50/60 Hz AC Generator Assembly (UOC 98E)**NOTE**

To assist during installation, tag all electrical wires and connectors prior to removal.

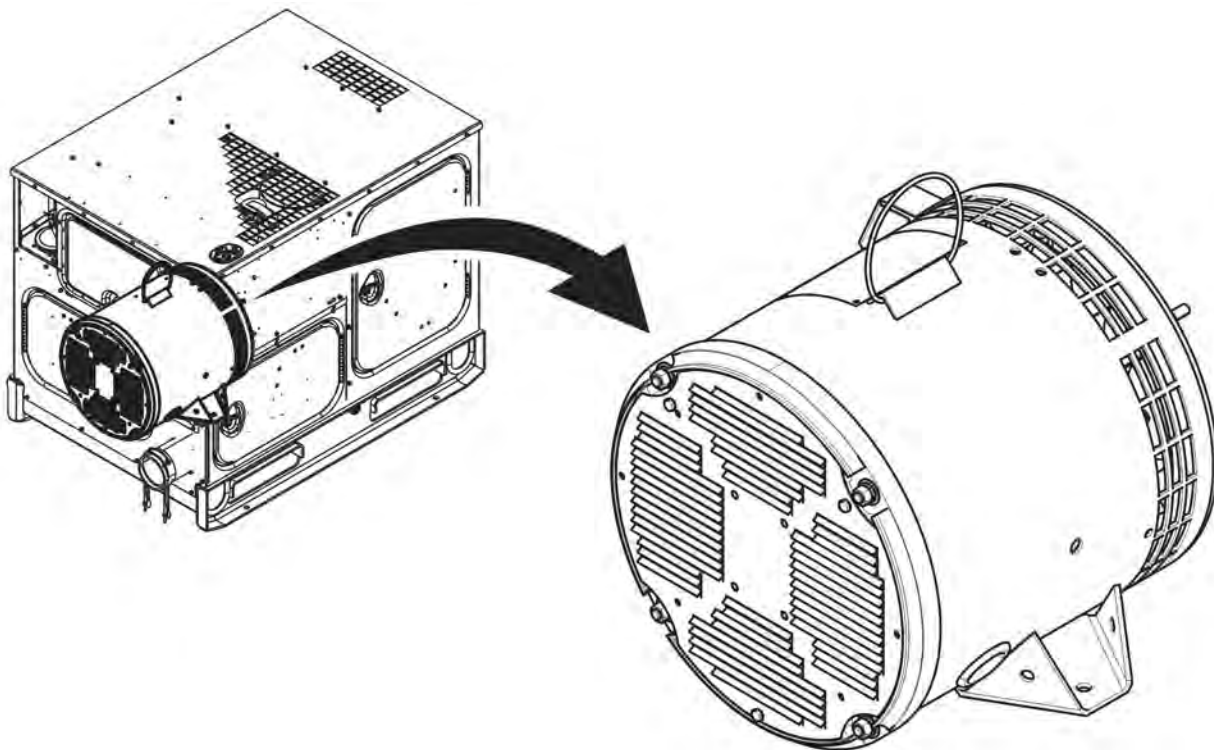
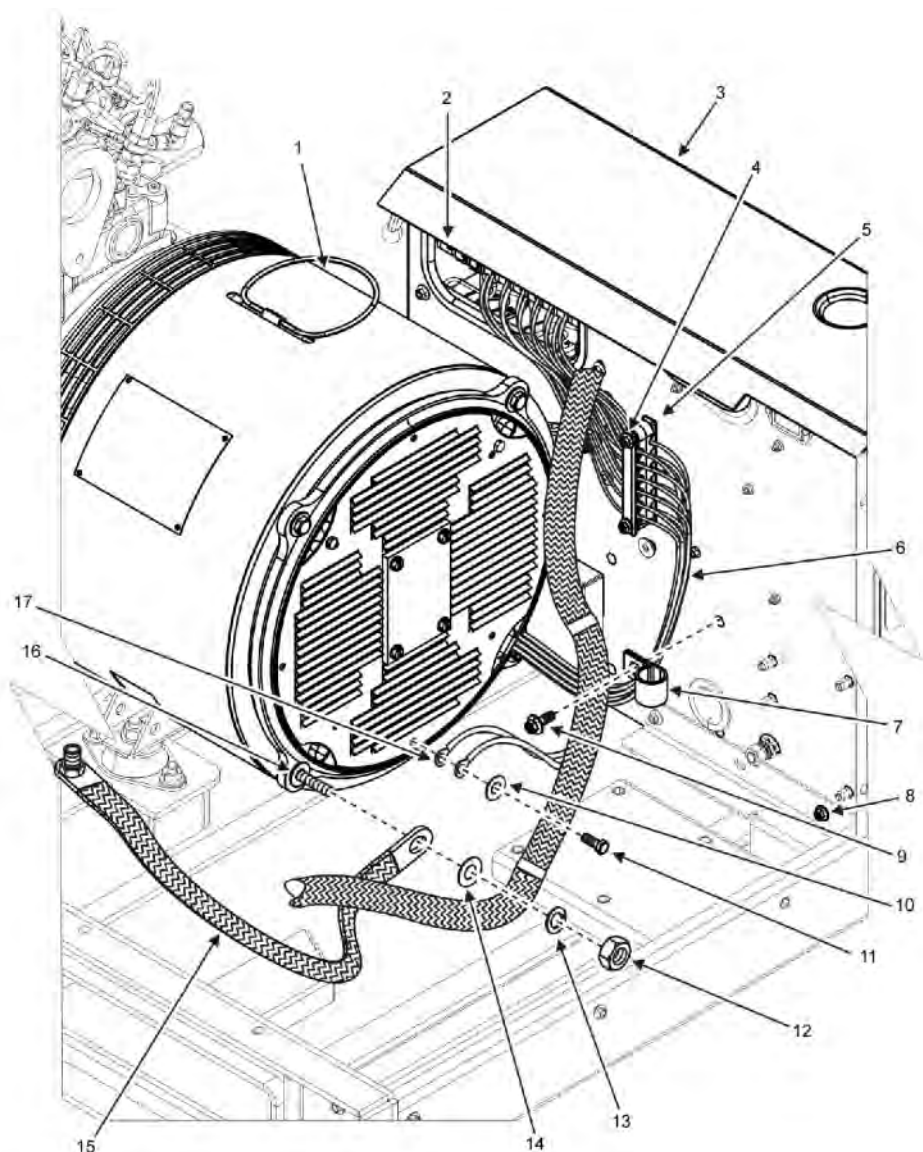


Figure 1. 50/60 Hz AC Generator - Location.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate 50/60 Hz AC generator (Figure 1).

REMOVE/INSTALL 50/60 HZ AC GENERATOR ASSEMBLY – CONTINUED

**Figure 2. 50/60 Hz AC Generator - Rear.**

3. Remove nut (Figure 2, Item 12), lockwasher (Figure 2, Item 13), flat washer (Figure 2, Item 14), and ground strap (Figure 2, Item 15) from through-bolt (Figure 2, Item 16) at rear of AC generator (Figure 2, Item 1). Discard lockwasher (Figure 2, Item 13).
4. Remove screw (Figure 2, Item 11) and washer (Figure 2, Item 10) securing two wire leads (Figure 2, Item 17) from rear of AC generator (Figure 2, Item 1). Tag two wire leads (Figure 2, Item 17) for identification at installation.
5. Remove screw (Figure 2, Item 9) and clamp (Figure 2, Item 7) securing 12 voltage selection switch wire leads (Figure 2, Item 6) to rear of output box (Figure 2, Item 3).
6. Remove two screws (Figure 2, Item 4) and finger retainer (Figure 2, Item 5) securing 12 voltage selection switch wire leads (Figure 2, Item 6) to rear of output box (Figure 2, Item 3).

REMOVE/INSTALL 50/60 HZ AC GENERATOR ASSEMBLY – CONTINUED

7. Tag and remove 12 voltage selection switch wire leads (Figure 2, Item 6) from voltage selection switch (Figure 2, Item 2) in output box (Figure 2, Item 3) (WP 0054, Remove/Install Voltage Selection Switch).
8. Remove screw (Figure 3, Item 9), washer (Figure 3, Item 8), and clamp (Figure 3, Item 7) securing 12 voltage selection switch wire leads (Figure 3, Item 6) to AC generator (Figure 3, Item 1).

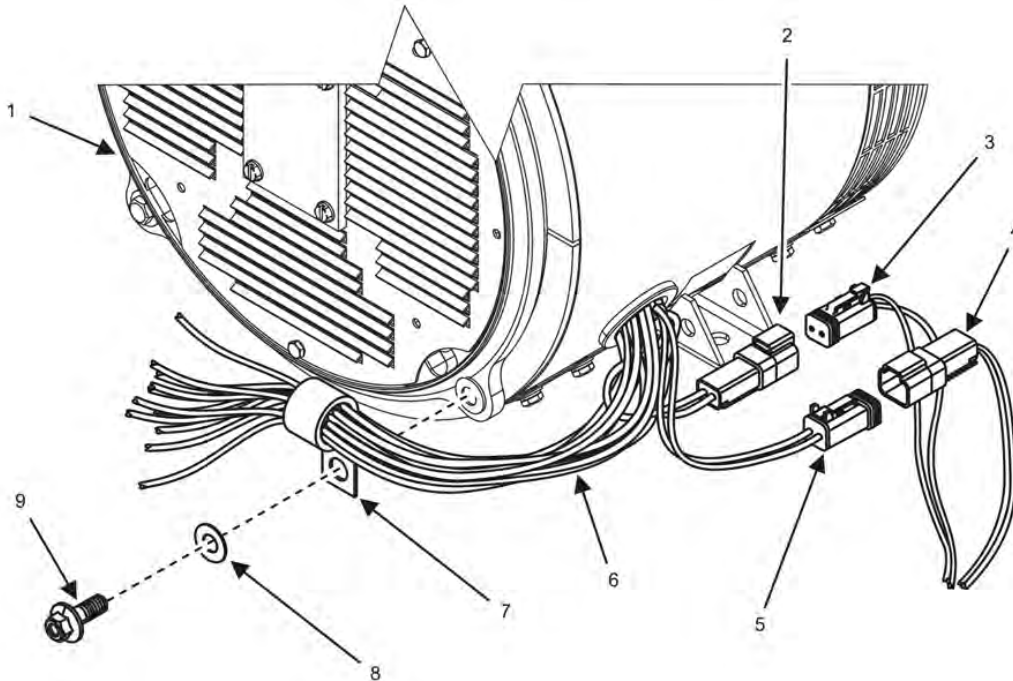
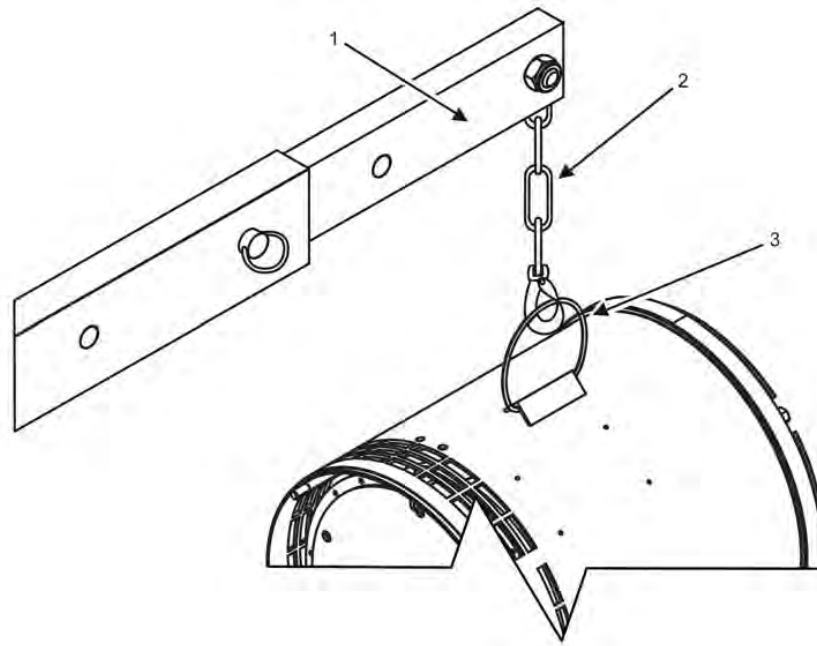


Figure 3. 50/60 Hz AC Generator Wiring - Removal.

9. Remove voltage selection switch (WP 0054, Remove/Install Voltage Selection Switch).
10. Remove output box (Figure 2, Item 3) by removing two lower screws (Figure 2, Item 8) from bottom of output box.
11. Reposition output box (Figure 2, Item 3) to allow removal of AC generator (Figure 3, Item 1).
12. Tag and disconnect wiring harness connector P90 (Figure 3, Item 3) from AC generator (Figure 3, Item 1) at female connector (Figure 3, Item 2).
13. Tag and disconnect wiring harness connector P85 (Figure 3, Item 4) from AC generator (Figure 3, Item 1) at male connector (Figure 3, Item 5).

REMOVE/INSTALL 50/60 HZ AC GENERATOR ASSEMBLY – CONTINUED**Figure 4. 50/60 Hz AC Generator Lift.**

14. Attach suitable lifting device (Figure 4, Item 1) with at least a 1,000 lb (454 kg) capacity to AC generator lift ring (Figure 4, Item 3).
15. Raise lifting device (Figure 4, Item 1) to remove slack in chain/sling (Figure 4, Item 2).
16. Place wooden block (not shown) under engine to support engine when AC generator (Figure 2, Item 1) is removed.

REMOVE/INSTALL 50/60 HZ AC GENERATOR ASSEMBLY – CONTINUED

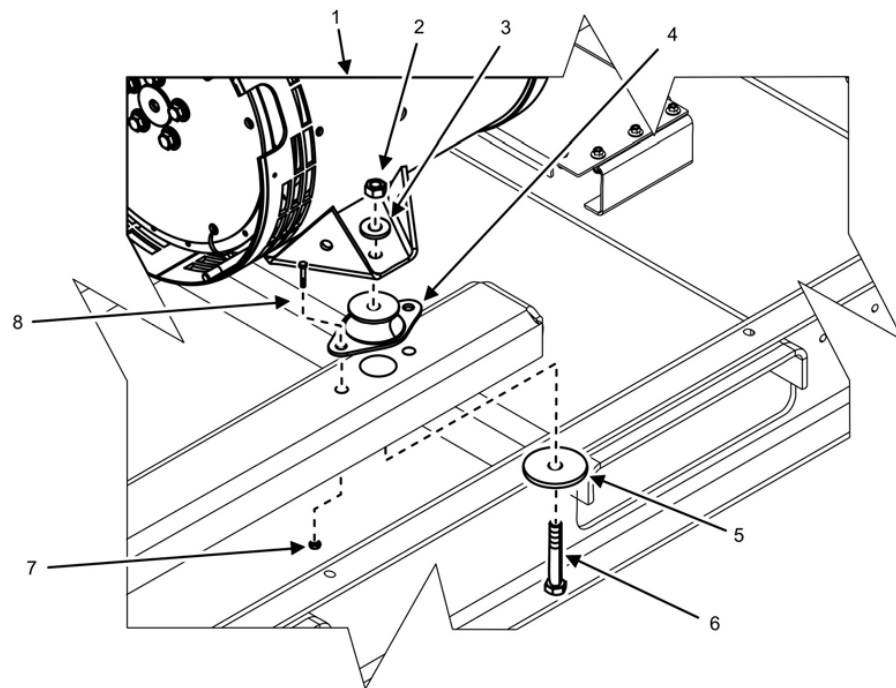


Figure 5. 50/60 Hz AC Generator - Removal.

17. Remove mounting screw (Figure 5, Item 6), snubbing washer (Figure 5, Item 5), flat washer (Figure 5, Item 3), and nut (Figure 5, Item 2) securing AC generator (Figure 5, Item 1) to left-side vibration isolator (Figure 5, Item 4).
18. Remove mounting screw (Figure 5, Item 6), snubbing washer (Figure 5, Item 5), flat washer (Figure 5, Item 3), and locknut (Figure 5, Item 2) securing AC generator (Figure 5, Item 1) to right-side vibration isolator (Figure 5, Item 4).

REMOVE/INSTALL 50/60 HZ AC GENERATOR ASSEMBLY – CONTINUED

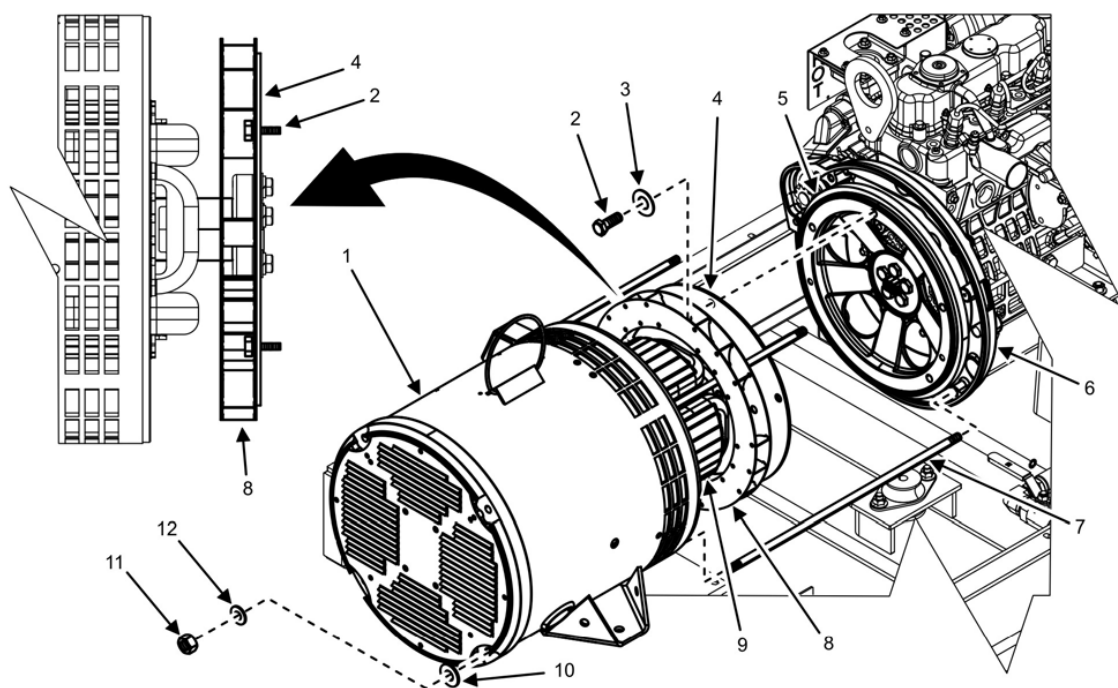


Figure 6. 50/60 Hz AC Generator and Engine Separation.

19. Remove four nuts (Figure 6, Item 11), four lockwashers (Figure 6, Item 12), and four flat washers (Figure 6, Item 10) securing through-bolts (Figure 6, Item 7) on end bell of AC generator stator (Figure 6, Item 1). Discard lockwashers (Figure 6, Item 12).
20. Install two nuts (Figure 6, Item 11) to one through-bolt (Figure 6, Item 7) without washers.
21. Loosen through-bolt (Figure 6, Item 7) by turning inner nut (Figure 6, Item 11) until through-bolt (Figure 6, Item 7) detaches from flywheel housing (Figure 6, Item 6).
22. Repeat Steps 19 and 20 for remaining three through-bolts (Figure 6, Item 7).
23. Raise AC generator assembly slightly using the lifting device (Figure 4, Item 1) and remove generator stator (Figure 6, Item 1) to expose fan (Figure 6, Item 8), drive plate (Figure 6, Item 4), and engine flywheel (Figure 6, Item 5) connection.

CAUTION

Proper installation of AC generator fan (Figure 6, Item 8) affects cooling airflow. Maintain the orientation of fan (Figure 6, Item 8) and drive plate (Figure 6, Item 4) for proper installation. Use wire ties to maintain the orientation of fan (Figure 6, Item 8) and drive plate (Figure 6, Item 4) in at least two places as screws (Figure 6, Item 2) are removed. Failure to comply may cause damage to equipment.

24. Support generator rotor (Figure 6, Item 9) with a wooden block and suitable lifting device at the ball bearing to allow rotation of rotor (Figure 6, Item 9).
25. Attach the suitable lifting device to support the generator rotor assembly (Figure 6, Item 9) as it is unbolted from the engine.
26. Remove one screw (Figure 6, Item 2) and one washer (Figure 6, Item 3) securing fan (Figure 6, Item 8) and drive plate (Figure 6, Item 4) to engine flywheel (Figure 6, Item 5).

REMOVE/INSTALL 50/60 HZ AC GENERATOR ASSEMBLY – CONTINUED

27. Secure fan (Figure 6, Item 8) to drive plate (Figure 6, Item 4) using wire tie to maintain proper orientation of components.
28. Rotate engine harmonic balancer hex capscrew clockwise (viewed from water pump end of engine) using socket and breaker bar to gain access to the remaining four screws (Figure 6, Item 2) as required.
29. Pull AC generator rotor (Figure 6, Item 9) to the rear, free of engine using lifting device.

NOTE

If AC generator rotor (Figure 6, Item 9) refuses to separate from engine, perform Steps 29 through 31 to separate engine and rotor.

30. Saturate area where engine flywheel (Figure 6, Item 5) and drive plate (Figure 6, Item 4) are connected with penetrating oil.
31. Allow penetrating oil to soak for 1 h.
32. Using a hammer and brass drift, strike around circumference of flywheel (Figure 6, Item 5) at point of contact between engine flywheel (Figure 6, Item 5) and drive plate (Figure 6, Item 4) until two components break free.

CAUTION

Be aware of generator set components, such as the output box, while maneuvering the AC generator stator (Figure 6, Item 1). Failure to comply may cause damage to equipment.

33. Place AC generator rotor (Figure 6, Item 9) on a suitable work surface.
34. Remove lifting device (Figure 4, Item 1) from AC generator rotor (Figure 6, Item 9).
35. Remove two screws (Figure 5, Item 8) and two nuts (Figure 5, Item 7) securing left-side vibration isolator (Figure 5, Item 4) to skid. Discard vibration isolator (Figure 5, Item 4).
36. Remove two screws (Figure 5, Item 8) and two nuts (Figure 5, Item 7) securing right-side vibration isolator (Figure 5, Item 4) to skid. Discard vibration isolator (Figure 5, Item 4).
37. Remove any remaining vibration isolator (Figure 5, Item 4) residue from mounts with compound cleaning solvent and wiping rag.

CAUTION

AC generator must be transported resting on the end bell. In this position, the rotor cannot slide out of the generator housing. Also, stabilize the rotor within the generator housing to prevent contact between the two components. Failure to comply may cause damage to equipment.

NOTE

Perform Step 38 only if the AC generator is to be returned for repair.

38. Ensure through-bolts (Figure 6, Item 7), flat washers (Figure 6, Item 10), lockwashers (Figure 6, Item 12), and nuts (Figure 6, Item 11) are returned to the repair facility with the AC generator assembly.

END OF TASK**Inspect 50/60 Hz AC Generator Assembly (UOC 98E)**

1. Inspect AC generator stator (Figure 6, Item 1) for damage and replace as required.
2. Inspect left and right AC generator mounts on skid for indications of structural weakness. Replace skid as required.

REMOVE/INSTALL 50/60 HZ AC GENERATOR ASSEMBLY – CONTINUED

3. Inspect all areas of skid for damage, corrosion, cracks, or other indications of structural weakness. Replace skid as required.

END OF TASK**Install 50/60 Hz AC Generator Assembly (UOC 98E)**

1. Clean mounting area, hardware, and surrounding skid area of dirt, debris, and grease using wiping rags and compound cleaning solvent.
2. Dispose of wiping rags IAW local SOP.
3. Apply a thin coat of general purpose grease to mounting surfaces of drive plate (Figure 6, Item 4), fan (Figure 6, Item 8), and engine flywheel (Figure 6, Item 5) to minimize formation of galvanic corrosion between components.
4. Position new vibration isolators (Figure 5, Item 4) to left- and right-side generator and skid mount.
5. Secure left- and right-side vibration isolators (Figure 5, Item 4) with two screws (Figure 5, Item 8) and two nuts (Figure 5, Item 7) to skid. Torque nuts to 35-42 ft•lb (48-57 N•m).

NOTE

Perform Step 6 only if a new or refurbished AC generator is being installed.

6. Remove any material used to prevent the rotor from contacting the generator housing during shipment.
7. Attach suitable lifting device (Figure 4, Item 1) with chain/sling (Figure 4, Item 2) to AC generator rotor (Figure 6, Item 9) at ball bearing.
8. Position AC generator rotor (Figure 6, Item 9) to its approximate mounting location on unit skid.
9. Align AC generator rotor (Figure 6, Item 9) with engine flywheel (Figure 6, Item 5).
10. Rotate engine harmonic balancer hex capscrew clockwise (as viewed from water pump end of engine) using socket and breaker bar to align mounting holes in AC generator drive plate (Figure 6, Item 4), fan (Figure 6, Item 8), and engine flywheel (Figure 6, Item 5) near the top of AC generator rotor to allow installation of screw (Figure 6, Item 2).

NOTE

Installation of the first screw (Figure 6, Item 2) to secure fan (Figure 6, Item 8), drive plate (Figure 6, Item 4), and flywheel (Figure 6, Item 5) is much easier if washer (Figure 6, Item 3) is not included. After the remaining four mounting screws (Figure 6, Item 2) with washers (Figure 6, Item 3) are installed, remove the initial screw (Figure 6, Item 2) and re-install with washer (Figure 6, Item 1) in place.

11. Install one screw (Figure 6, Item 2) and washer (Figure 6, Item 3) finger-tight to secure drive plate (Figure 6, Item 4), fan (Figure 6, Item 8), and engine flywheel (Figure 6, Item 5) in the proper orientation.
12. Continue to rotate crankshaft to position the remaining mounting holes one at a time in the AC generator drive plate (Figure 6, Item 4), fan (Figure 6, Item 8), and engine flywheel (Figure 6, Item 5).
13. Cut and discard wire ties installed during removal procedure to maintain orientation of AC generator drive plate (Figure 6, Item 4), fan (Figure 6, Item 8), and engine flywheel (Figure 6, Item 5) as they are presented.
14. Install remaining four screws (Figure 6, Item 2) and four washers (Figure 6, Item 3) finger-tight.
15. Torque screws (Figure 6, Item 2) to 39-46 ft•lb (53-63 N•m).
16. Support AC generator rotor (Figure 6, Item 9) at ball bearing using a wooden block and remove the lifting device.
17. Attach a suitable lifting device to AC generator stator (Figure 6, Item 1) and position AC generator stator (Figure 6, Item 1) to AC generator rotor (Figure 6, Item 9).

REMOVE/INSTALL 50/60 HZ AC GENERATOR ASSEMBLY – CONTINUED

18. Slide AC generator stator (Figure 6, Item 1) over AC generator rotor (Figure 6, Item 9) toward engine to completely cover AC generator rotor (Figure 6, Item 9).
19. Lower AC generator (Figure 5, Item 1) slowly, using lifting device (Figure 4, Item 1), until mounting holes on AC generator mounts align with mounting holes on vibration isolators (Figure 5, Item 4).
20. Insert mounting screw (Figure 5, Item 6) with snubbing washer (Figure 5, Item 5) through new vibration isolators (Figure 5, Item 4) on generator skid mounts to align mounting holes.
21. Install flat washers (Figure 5, Item 3) and locknuts (Figure 5, Item 2) to generator mounting screws (Figure 5, Item 6) loosely.
22. Install two nuts (Figure 6, Item 11) to one through-bolt (Figure 6, Item 7).
23. Install through-bolt (Figure 6, Item 7) through AC generator stator (Figure 6, Item 1) by turning outer nut (Figure 6, Item 11) until through-bolt (Figure 6, Item 7) secures generator housing to flywheel housing (Figure 6, Item 6).
24. Remove two nuts (Figure 6, Item 11) from through-bolt (Figure 6, Item 7) once installed to flywheel housing (Figure 6, Item 6).
25. Repeat Steps 21 through 23 to install remaining three through-bolts (Figure 6, Item 7).
26. Install nut (Figure 6, Item 11), new lockwasher (Figure 6, Item 12), and flat washer (Figure 6, Item 10) to four through-bolts (Figure 6, Item 7).
27. Torque four nuts (Figure 6, Item 11) to 28 to 32 ft•lb (38 to 44 N•m).
28. Remove supporting block (not shown) from under engine.
29. Torque two locknuts (Figure 5, Item 2) installed in Step 21 to 62-76 ft•lb (85-104 N•m).
30. Remove lifting device (Figure 4, Item 1) from AC generator.
31. Reposition output box (Figure 2, Item 3) onto unit skid and secure by installing two screws into captive nuts (Figure 2, Item 8).

NOTE

Use tags applied to electrical wires and connectors during removal to aide in installation.

Identification tags should remain in place until generator is completely reassembled and has been tested for proper operation.

32. Apply a thin coat of electrically conductive grease to all electrical connections prior to installation.
33. Insert 12 voltage selection switch wire leads (Figure 2, Item 6) into rear of output box (Figure 2, Item 3) near voltage selection switch (Figure 2, Item 2).
34. Connect 12 voltage selection switch wire leads (Figure 2, Item 6) to voltage selection switch (Figure 2, Item 2) in output box (Figure 2, Item 3) (WP 0054, Remove/Install Voltage Selection Switch).
35. Secure 12 voltage selection switch wire leads (Figure 2, Item 6) to rear of AC generator (Figure 3, Item 1) by installing screw (Figure 3, Item 9), washer (Figure 3, Item 8), and clamp (Figure 3, Item 7).
36. Connect wiring harness connector P85 (Figure 3, Item 4) to AC generator (Figure 3, Item 1) at male connector (Figure 3, Item 5).
37. Connect wiring harness connector P90 (Figure 3, Item 3) to AC generator (Figure 3, Item 1) at female connector (Figure 3, Item 2).
38. Install ground strap (Figure 2, Item 15) to through-bolt (Figure 2, Item 16) at rear of AC generator (Figure 2, Item 1) and secure by new lockwasher (Figure 2, Item 13), flat washer (Figure 2, Item 14), and nut (Figure 2, Item 12).

REMOVE/INSTALL 50/60 HZ AC GENERATOR ASSEMBLY – CONTINUED

39. Torque nut (Figure 2, Item 12) to 28-32 ft•lb (38-43 N•m).
40. Install two wire leads (Figure 2, Item 17) to rear of AC generator (Figure 2, Item 1) using tags installed at removal as a guide.
41. Secure wire leads (Figure 2, Item 17) to rear of AC generator (Figure 2, Item 1) by installing screw (Figure 2, Item 11) and washer (Figure 2, Item 10).
42. Torque screw (Figure 2, Item 11) to 20 in•lb (21 N•m).
43. Install 12 voltage selection switch wire leads (Figure 2, Item 6) to two finger retainers (Figure 2, Item 5) and secure finger retainers (Figure 2, Item 5) to rear of output box (Figure 2, Item 3) by installing two screws (Figure 2, Item 4).
44. Install clamp (Figure 2, Item 7) securing 12 voltage selection switch wire leads (Figure 2, Item 6) to rear of output box (Figure 2, Item 3) and secure by installing screw (Figure 2, Item 9).
45. Install relay panel (WP 0061, Remove/Install Relay Panel).
46. Install and adjust engine speed sensor (WP 0067, Remove/Install Engine Speed Sensor).
47. Install starter (WP 0077, Remove/Install Starter).
48. Install fuel tank (WP 0046, Remove/Install Fuel Tank).
49. Install interior body panels (WP 0035, Remove/Install Interior Body Panels).
50. Install right-side body panel (WP 0032, Remove/Install Right-side Body Panel).
51. Install left-side body panel (WP 0031, Remove/Install Left-side Body Panel).
52. Install rear body panel (WP 0030, Remove/Install Rear Body Panel).
53. Install front body panel (WP 0029, Remove/Install Front Body Panel).
54. Install DCS (WP 0017, Remove/Install DCS).
55. Install top body panel (WP 0028, Remove/Install Top Body Panel).
56. Connect negative battery cable (WP 0036, Remove /Install Batteries).
57. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
58. Start engine, check for proper operation, and repair as required. Bring coolant to normal operating temperature and then apply a 100% rated load for 30 min (TM 9-6115-749-10).
59. Check all fluid levels and fill as required (TM 9-6115-749-10).

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

REMOVE/INSTALL 400 HZ AC GENERATOR ASSEMBLY

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
 Wrench, Torque, Dial, 1/4 in Drive, 30 in•lb (WP 0162, Table 2, Item 42)
 Wrench, Torque, Dial, 3/8 in Drive, 300 in•lb (WP 0162, Table 2, Item 43)
 Wrench, Torque, Click, Ratcheting, 3/8 in Drive, 75 ft•lb (WP 0162, Table 2, Item 41)

Materials/Parts

Generator, assembly, 5 kW, 400 Hz (WP 0122, Item 1)
 Isolator, vibration, alternator mount (2) (WP 0120, Item 13)
 Nut, Hexagon (2) (WP 0120, Item 8)
 Washer, lock (WP 0122, Item 13)
 Antifreeze, ethylene glycol (WP 0163, Table 1, Item 2)
 Cap set, protective (WP 0163, Table 1, Item 8)
 Cleaning compound, solvent (WP 0163, Table 1, Item 10)
 Distilled water (WP 0163, Table 1, Item 17)
 Fuel, diesel (WP 0163, Table 1, Item 19)
 Grease, electrically conductive (WP 0163, Table 1, Item 20)
 Pan, drain (WP 0163, Table 1, Item 28)
 Penetrating oil (WP 0163, Table 1, Item 29)
 Rag, wiping (WP 0163, Table 1, Item 31)
 Strap, tiedown (WP 0163, Table 1, Item 34)
 Tag, marker (WP 0163, Table 1, Item 35)

Personnel Required

91D (1)
 Assistant (2)

References

WP 0054, Remove/Install Voltage Selection Switch

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool
 Battery ground cable removed (WP 0036, Remove/Install Batteries)
 Top body panel removed (WP 0028, Remove/Install Top Body Panel)
 DCS removed (WP 0017, Remove/Install DCS)
 Front body panel removed (WP 0029, Remove/Install Front Body Panel)
 Rear body panel removed (WP 0030, Remove/Install Rear Body Panel)
 Right-side body panel removed (WP 0032, Remove/Install Right-side Body Panel)
 Left-side body panel removed (WP 0031, Remove/Install Left-side Body Panel)
 Interior bulkhead panel removed (WP 0035, Remove/Install Interior Body Panels)
 Fuel tank removed (WP 0046, Remove/Install Fuel Tank)
 Engine speed sensor removed (WP 0067, Remove/Install Engine Speed Sensor)
 Relay panel removed (WP 0061, Remove/Install Relay Panel)

REMOVE/INSTALL 400 HZ AC GENERATOR ASSEMBLY

WARNING

AC generator assembly weighs approximately 252-262 lb (114-119 kg). Use suitable lifting device with a capacity of at least 1,000 lb (453.6 kg) to lift the weight of the assembly. Do not stand or put arms, legs, or any body part under hoisted load. Failure to comply may cause injury or death to personnel.

REMOVE/INSTALL 400 HZ AC GENERATOR ASSEMBLY – CONTINUED**WARNING**

Compound cleaning solvent is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection is required. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply may cause injury or death to personnel.

Remove 400 Hz AC Generator Assembly (UOC 98F)**NOTE**

To assist during installation, tag all electrical wires and connectors prior to removal.

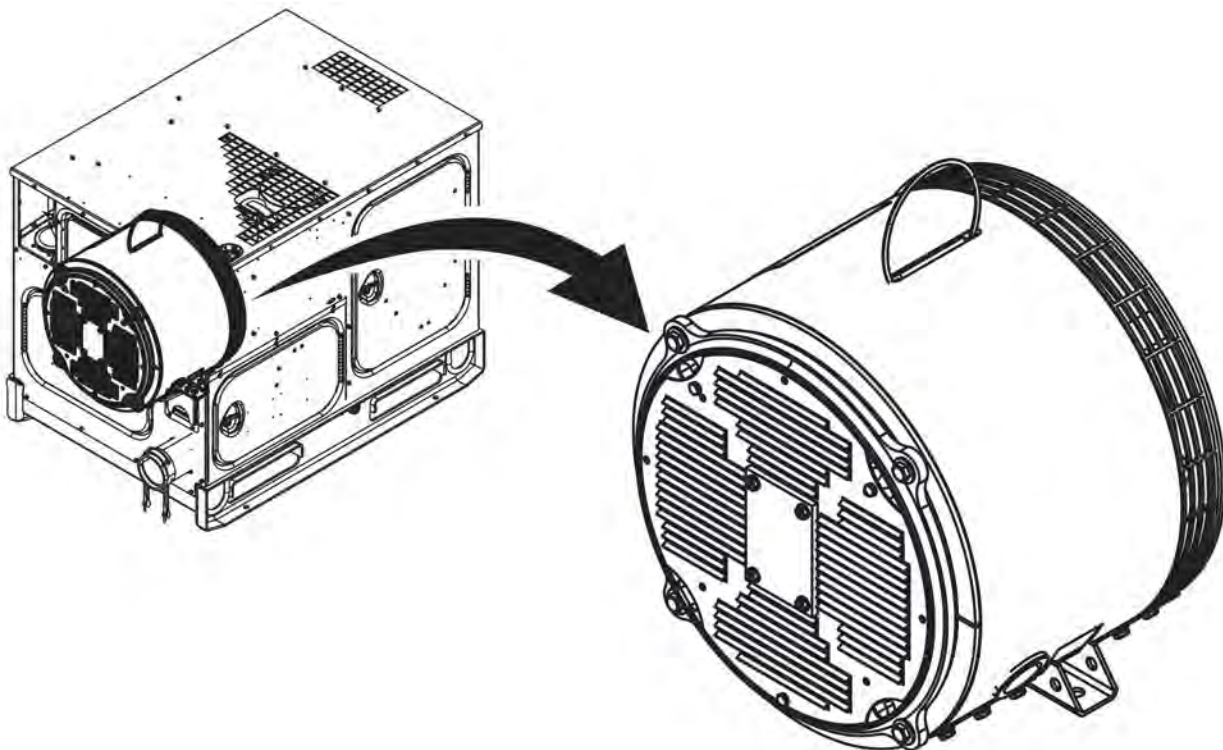
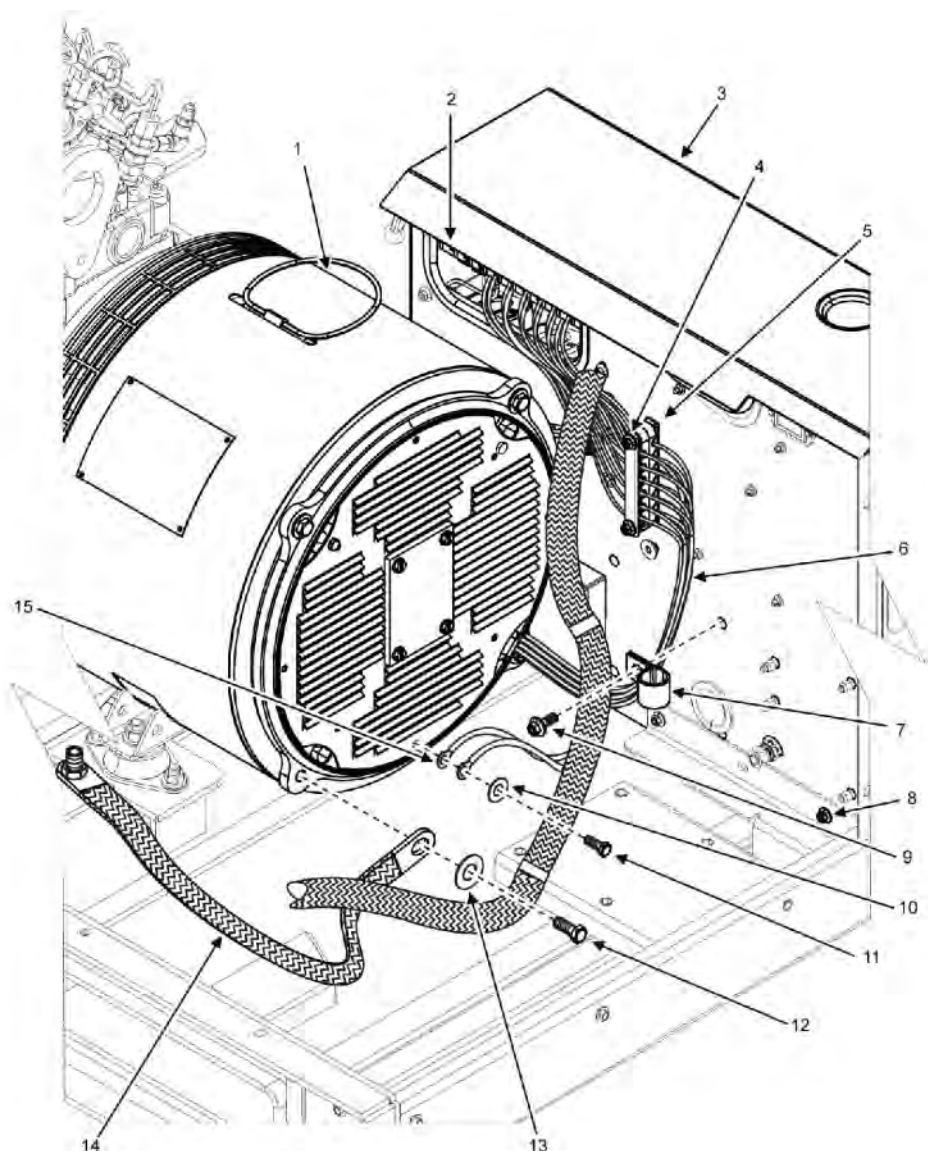


Figure 1. 400 Hz AC Generator - Location.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate 400 Hz AC generator (Figure 1).

REMOVE/INSTALL 400 HZ AC GENERATOR ASSEMBLY – CONTINUED

**Figure 2. 400 Hz AC Generator - Rear.**

3. Remove screw (Figure 2, Item 12), washer (Figure 2, Item 13), and ground strap (Figure 2, Item 14) from rear of AC generator (Figure 2, Item 1).
4. Remove screw (Figure 2, Item 11) and washer (Figure 2, Item 10) securing two wire leads (Figure 2, Item 15) from rear of AC generator (Figure 2, Item 1). Tag two wire leads (Figure 2, Item 15) for identification at installation.
5. Remove two screws (Figure 2, Item 4) and two finger retainers (Figure 2, Item 5) securing 12 voltage selection switch wire leads (Figure 2, Item 6) to rear of output box (Figure 2, Item 3).
6. Remove screw (Figure 2, Item 9) and clamp (Figure 2, Item 7) securing 12 voltage selection switch wire leads (Figure 2, Item 6) to rear of output box (Figure 2, Item 3).

REMOVE/INSTALL 400 HZ AC GENERATOR ASSEMBLY – CONTINUED

7. Tag and remove 12 voltage selection switch wire leads (Figure 2, Item 6) from AC generator (Figure 2, Item 1) at voltage selection switch (Figure 2, Item 2) in output box (Figure 2, Item 3) (WP 0054, Remove/Install Voltage Selection Switch).
8. Loosen output box (Figure 2, Item 3) by removing two screws from captive nuts (Figure 2, Item 8).
9. Reposition output box (Figure 2, Item 3) to allow removal of AC generator (Figure 2, Item 1).

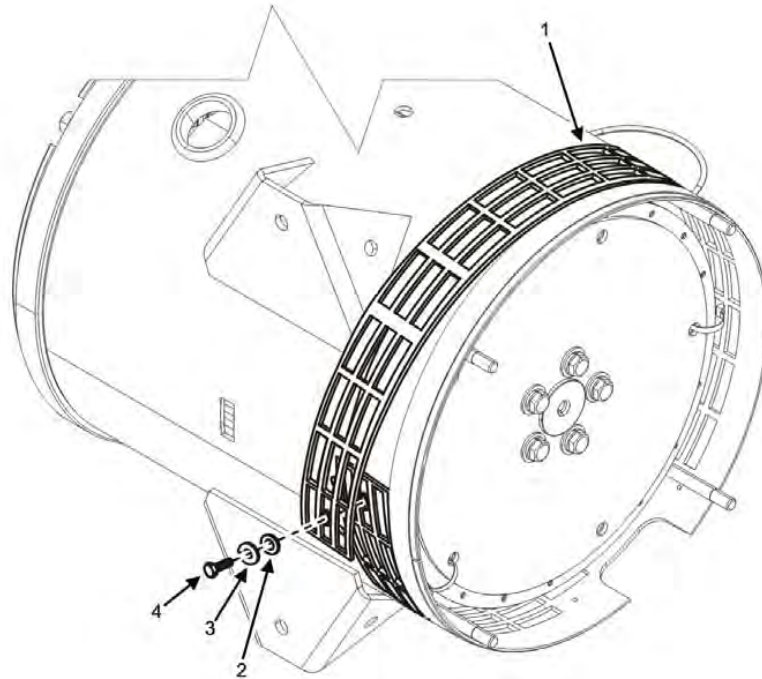


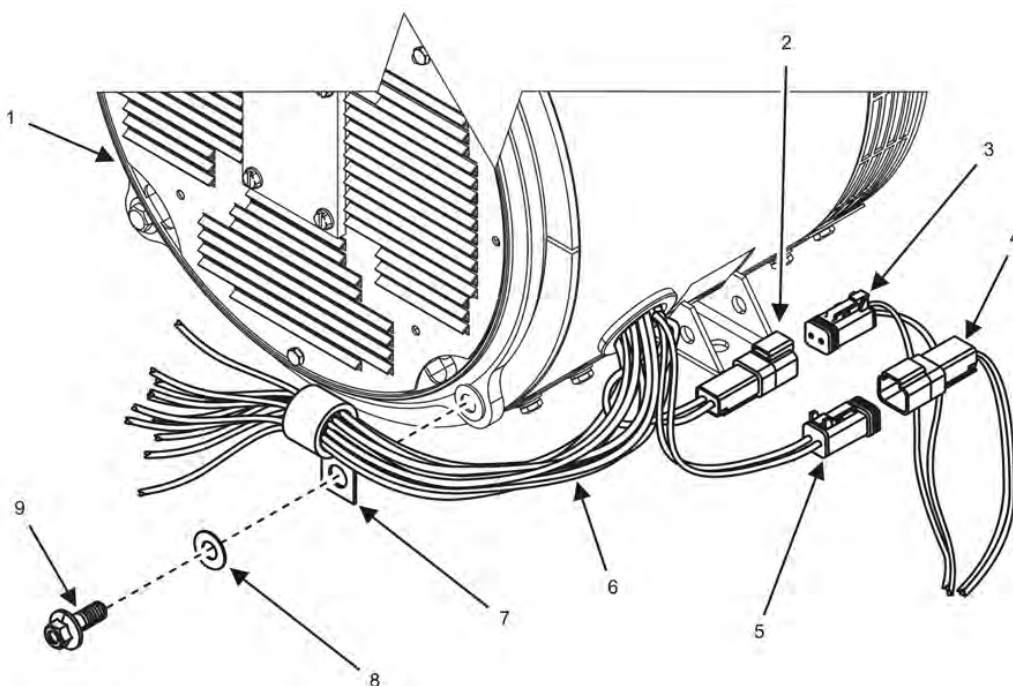
Figure 3. 400 Hz AC Generator Screen - Removal.

NOTE

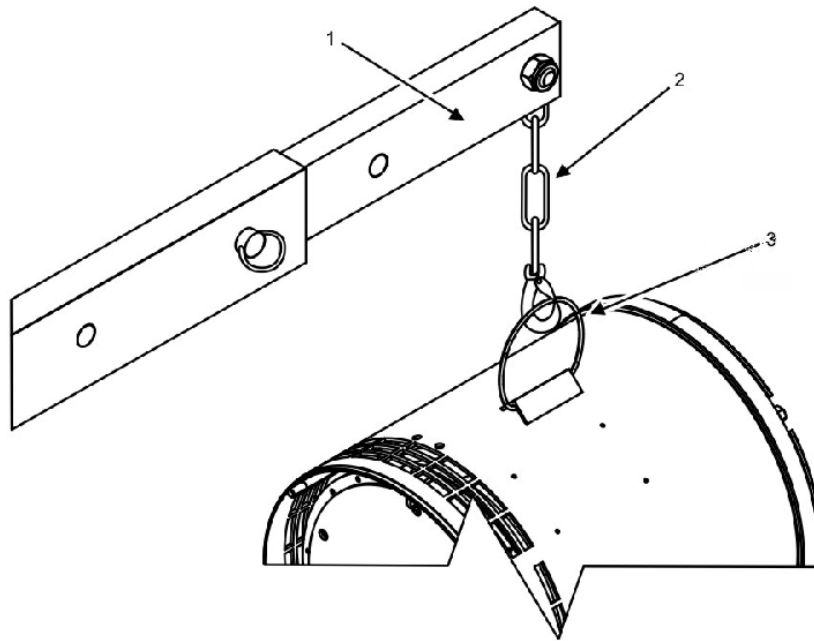
The AC generator in Figure 3 is shown removed from the skid and rotated to show the mounting hardware for screen (Figure 3, Item 1) located on underside of AC generator.

10. Remove screw (Figure 3, Item 4), lockwasher (Figure 3, Item 3), flat washer (Figure 3, Item 2), and screen (Figure 3, Item 1) from AC generator. Discard lockwasher (Figure 3, Item 3).
11. Inspect screen (Figure 3, Item 1) for signs of obvious damage. Replace screen (Figure 3, Item 1) as required.

REMOVE/INSTALL 400 HZ AC GENERATOR ASSEMBLY – CONTINUED

**Figure 4. 400 Hz AC Generator Wiring - Removal.**

12. Tag and disconnect wiring harness connector P90 (Figure 4, Item 3) from AC generator (Figure 4, Item 1) at female connector (Figure 4, Item 2).
13. Tag and disconnect wiring harness connector P85 (Figure 4, Item 4) from AC generator (Figure 4, Item 1) at male connector (Figure 4, Item 5).
14. Remove screw (Figure 4, Item 9), washer (Figure 4, Item 8), and clamp (Figure 4, Item 7) that secures 12 voltage selection switch wire leads (Figure 4, Item 6) to AC generator (Figure 4, Item 1).

REMOVE/INSTALL 400 HZ AC GENERATOR ASSEMBLY – CONTINUED**Figure 5. 400 Hz AC Generator Lift.**

15. Attach suitable lifting device (Figure 5, Item 1) with at least a 1,000 lb (454 kg) capacity to AC generator lift ring (Figure 5, Item 3).
16. Raise lifting device (Figure 5, Item 1) to remove slack in chain/sling (Figure 5, Item 2).
17. Place wooden block (not shown) under engine to support engine when AC generator (Figure 6, Item 1) is removed.
18. Rotate engine harmonic balancer hex capscrew clockwise (viewed from water pump end of engine) using socket and breaker bar to gain access to one screw (Figure 6, Item 2) through slot in AC generator (Figure 6, Item 1) case.
19. Remove one screw (Figure 6, Item 2) and one washer (Figure 6, Item 3) securing fan (Figure 6, Item 4) and drive plate (Figure 6, Item 5) to engine flywheel (Figure 6, Item 6) through slot in AC generator housing opened by removal of screen (Figure 3, Item 1).

REMOVE/INSTALL 400 HZ AC GENERATOR ASSEMBLY – CONTINUED

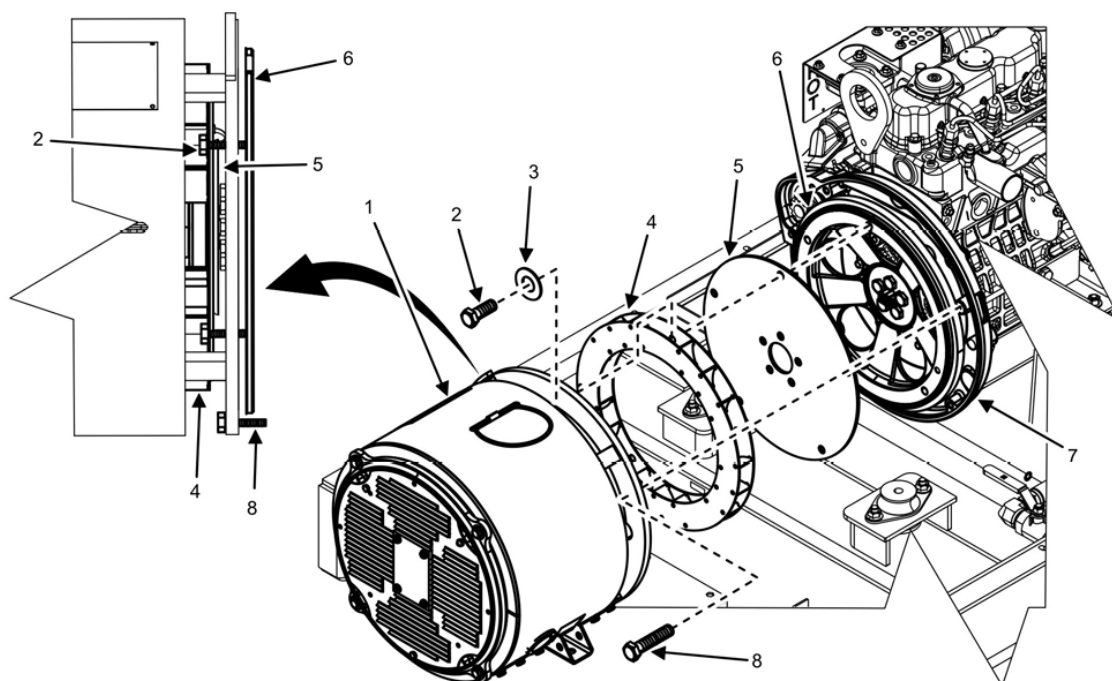


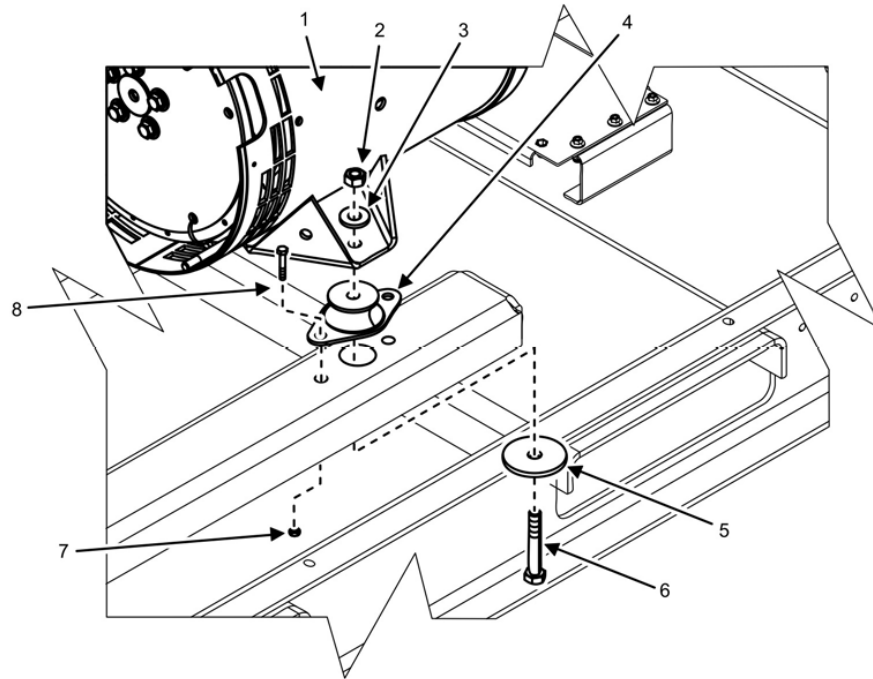
Figure 6. 400 Hz AC Generator and Engine Separation.

CAUTION

Proper installation of AC generator fan affects cooling airflow. Use wire ties to maintain the orientation of fan (Figure 6, Item 4) and drive plate (Figure 6, Item 5) in at least two places as screws are removed. Failure to comply may cause damage to equipment.

20. Secure generator fan (Figure 6, Item 4) to drive plate (Figure 6, Item 5) using wire tie to maintain proper orientation of components.
21. Rotate engine harmonic balancer hex capscrew clockwise (viewed from water pump end of engine) using socket and breaker bar to gain access to remaining four screws (Figure 6, Item 2) through slots in AC generator (Figure 6, Item 1) case.
22. Remove remaining four screws (Figure 6, Item 2) and four washers (Figure 6, Item 3) securing fan (Figure 6, Item 4) and drive plate (Figure 6, Item 5) to engine flywheel (Figure 6, Item 6).
23. Remove four screws (Figure 6, Item 8) securing AC generator (Figure 6, Item 1) to engine flywheel housing (Figure 6, Item 7).
24. Remove mounting screw (Figure 7, Item 6), snubbing washer (Figure 7, Item 5), flat washer (Figure 7, Item 3), and nut (Figure 7, Item 2) securing AC generator (Figure 7, Item 1) to left-side vibration isolator (Figure 7, Item 4).
25. Remove mounting screw (Figure 7, Item 6), snubbing washer (Figure 7, Item 5), flat washer (Figure 7, Item 3), and nut (Figure 7, Item 2) securing AC generator (Figure 7, Item 1) to right-side vibration isolator (Figure 7, Item 4).

REMOVE/INSTALL 400 HZ AC GENERATOR ASSEMBLY – CONTINUED

**Figure 7. 400 Hz AC Generator - Removal.**

26. Pull AC generator (Figure 7, Item 1) to the rear, free of engine using lifting device.

NOTE

If AC generator rotor refuses to separate from engine, perform Steps 27 through 29 to separate engine and rotor.

27. Saturate area where engine flywheel (Figure 6, Item 6) and drive plate (Figure 6, Item 5) are connected with penetrating oil.
28. Allow penetrating oil to soak for 1 h.
29. Using a hammer and brass drift, strike around circumference of flywheel (Figure 6, Item 6) at point of contact between engine flywheel (Figure 6, Item 6) and drive plate (Figure 6, Item 5) until two components break free.

CAUTION

Be aware of generator set components, such as the output box, while maneuvering the AC generator (Figure 7, Item 1). Failure to comply may cause damage to equipment.

30. Remove AC generator (Figure 7, Item 1) from unit skid using suitable lifting device (Figure 5, Item 1).
31. Place AC generator (Figure 7, Item 1) on a suitable work surface.
32. Remove lifting device (Figure 5, Item 1) from AC generator (Figure 7, Item 1) lifting ring.
33. Remove two screws (Figure 7, Item 8) and two nuts (Figure 7, Item 7) securing left-side vibration isolator (Figure 7, Item 4) to skid. Discard vibration isolator (Figure 7, Item 4).
34. Remove two screws (Figure 7, Item 8) and two nuts (Figure 7, Item 7) securing right-side vibration isolator (Figure 7, Item 4) to skid. Discard vibration isolator (Figure 7, Item 4).

REMOVE/INSTALL 400 HZ AC GENERATOR ASSEMBLY – CONTINUED**WARNING**

Compound cleaning solvent is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection is required. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply may cause injury or death to personnel.

35. Remove any remaining vibration isolator (Figure 7, Item 4) residue from mounts with compound cleaning solvent and wiping rag.

CAUTION

AC generator must be transported resting on the end bell. In this position, the rotor cannot slide out of the generator housing. Also, stabilize the rotor within the generator housing to prevent contact between the two components. Failure to comply may cause damage to equipment.

NOTE

Perform Step 36 only if the AC generator (Figure 7, Item 1) is to be returned for repair.

36. Install screen (Figure 3, Item 1) over AC generator and secure by installing screw (Figure 3, Item 4), new lockwasher (Figure 3, Item 3), and flat washer (Figure 3, Item 2).

END OF TASK**Inspect 400 Hz AC Generator Assembly (UOC 98F)**

1. Inspect AC generator (Figure 7, Item 1) for damage and replace as required.
2. Inspect left and right AC generator mounts on skid for indications of structural weakness. Replace skid as required.
3. Inspect skid for damage, corrosion, cracks, or other indications of structural weakness. Replace skid as required.

END OF TASK**Install 400 Hz AC Generator Assembly (UOC 98F)**

1. Clean mounting area, hardware, and surrounding skid area of dirt, debris, and grease using wiping rags and compound cleaning solvent.
2. Dispose of wiping rags IAW local SOP.
3. Apply a thin coat of general purpose grease to mounting surfaces of drive plate (Figure 6, Item 5), fan (Figure 6, Item 4), and engine flywheel (Figure 6, Item 6) to minimize formation of galvanic corrosion between components.
4. Position new vibration isolators (Figure 7, Item 4) to left- and right-side generator and skid mount.
5. Secure left- and right-side vibration isolators (Figure 7, Item 4) with two screws (Figure 7, Item 8) and two nuts (Figure 7, Item 7) to skid. Torque nuts to 35-42 ft•lb (to 48-57 N•m).

NOTE

Perform Steps 6 and 7 only if a new or refurbished AC generator (Figure 7, Item 1) is being installed.

6. Remove screw (Figure 3, Item 4), lockwasher (Figure 3, Item 3), flat washer (Figure 3, Item 2), and screen (Figure 3, Item 1) from AC generator. Discard lockwasher (Figure 3, Item 3).
7. Remove any material used to prevent the rotor from contacting the generator housing during shipping.

REMOVE/INSTALL 400 HZ AC GENERATOR ASSEMBLY – CONTINUED

8. Attach suitable lifting device (Figure 5, Item 1) with chain/sling (Figure 5, Item 2) to lift ring (Figure 5, Item 3) of AC generator (Figure 7, Item 1).
9. Position AC generator (Figure 7, Item 1) at its approximate mounting location on unit skid.
10. Insert two mounting screws (Figure 7, Item 6) with two snubbing washers (Figure 7, Item 5) through new vibration isolators (Figure 7, Item 4) on generator skid mounts to align mounting holes.
11. Lower AC generator (Figure 7, Item 1) slowly, using lifting device (Figure 5, Item 1), until mounting holes on AC generator mounts align with mounting screws (Figure 7, Item 6).
12. Install two flat washers (Figure 7, Item 3) and two nuts (Figure 7, Item 2) to two screws (Figure 7, Item 6) positioned in Step 10 finger-tight.
13. Align AC generator (Figure 6, Item 1) with engine flywheel (Figure 6, Item 6).
14. Install four screws (Figure 6, Item 8) securing AC generator (Figure 6, Item 1) to flywheel housing (Figure 6, Item 7). Torque screws (Figure 6, Item 8) to 35-42 ft•lb (48-57 N•m).
15. Rotate engine harmonic balancer hex capscREW clockwise (as viewed from water pump end of engine) using socket and breaker bar to align mounting holes in AC generator drive plate (Figure 6, Item 5), fan (Figure 6, Item 4), and engine flywheel (Figure 6, Item 6) near the top of AC generator housing to ease installation of screw (Figure 6, Item 2).
16. Install screw (Figure 6, Item 2) without washer (Figure 6, Item 3) finger-tight.
17. Continue to rotate the crankshaft to align the remaining mounting holes one at a time near the top of AC generator housing.
18. Cut and discard wire ties installed during removal procedure to maintain orientation of AC generator drive plate (Figure 6, Item 5), fan (Figure 6, Item 4), and engine flywheel (Figure 6, Item 6) as they are presented.
19. Install remaining four screws (Figure 6, Item 2) and four washers (Figure 6, Item 3) finger-tight.
20. Continue to rotate the crankshaft to position the first mounting screw (Figure 6, Item 2) that does not have a washer near the top of AC generator housing.
21. Remove the first mounting screw (Figure 6, Item 2) and re-install mounting screw (Figure 6, Item 2) this time with a washer (Figure 6, Item 3).
22. Rotate crankshaft again to position screws (Figure 6, Item 2) near the top of AC generator housing. Torque screws (Figure 6, Item 2) to 39-46 ft•lb (53-63 N•m).
23. Torque two locknuts (Figure 7, Item 2) installed in Step 12 to 62-76 ft•lb (85-104 N•m).
24. Remove supporting wooden block from under engine.
25. Remove lifting device (Figure 5, Item 1) from lift ring (Figure 5, Item 3) on AC generator (Figure 6, Item 1).
26. Reposition output box (Figure 2, Item 3) to its mounting location on unit skid and secure by installing two screws into captive nuts (Figure 2, Item 8).

NOTE

Use tags applied to electrical wires and connectors during removal to aide in installation.

Identification tags should remain in place until generator is completely reassembled and has been tested for proper operation.

27. Apply a thin coat of electrically conductive grease to all electrical connections prior to installation.
28. Insert 12 voltage selection switch wire leads (Figure 2, Item 6) into rear of output box (Figure 2, Item 3) near voltage selection switch (Figure 2, Item 2).
29. Connect 12 voltage selection switch wire leads (Figure 2, Item 6) to voltage selection switch (Figure 2, Item 2) in output box (Figure 2, Item 3) (WP 0054, Remove/Install Voltage Selection Switch).

REMOVE/INSTALL 400 HZ AC GENERATOR ASSEMBLY – CONTINUED

30. Connect wiring harness connector P85 (Figure 4, Item 4) to AC generator (Figure 4, Item 1) at male connector (Figure 4, Item 5).
31. Connect wiring harness connector P90 (Figure 4, Item 3) to AC generator (Figure 4, Item 1) at female connector (Figure 4, Item 2).
32. Secure 12 voltage selection switch wire leads (Figure 4, Item 6) to AC generator (Figure 4, Item 1) by installing screw (Figure 4, Item 9), washer (Figure 4, Item 8), and clamp (Figure 4, Item 7).
33. Install screen (Figure 3, Item 1) over AC generator and secure by installing screw (Figure 3, Item 4), new lockwasher (Figure 3, Item 3), and flat washer (Figure 3, Item 2).
34. Install ground strap (Figure 2, Item 14) to rear of AC generator (Figure 2, Item 1) and secure by installing screw (Figure 2, Item 12) and washer (Figure 2, Item 13).
35. Install two wire leads (Figure 2, Item 15) to rear of AC generator (Figure 2, Item 1) using tags installed at removal as a guide.
36. Secure wire leads (Figure 2, Item 15) to rear of AC generator (Figure 2, Item 1) by installing screw (Figure 2, Item 11) and washer (Figure 2, Item 10).
37. Torque screw (Figure 2, Item 12) to 28-32 ft•lb (38-43 N•m).
38. Torque screw (Figure 2, Item 11) to 20 in•lb (2.5 N•m).
39. Install 12 voltage selection switch wire leads (Figure 2, Item 6) to two finger retainers (Figure 2, Item 5) and secure finger retainers (Figure 2, Item 5) to rear of output box (Figure 2, Item 3) by installing two screws (Figure 2, Item 4).
40. Install clamp (Figure 2, Item 7) securing 12 voltage selection switch wire leads (Figure 2, Item 6) to rear of output box (Figure 2, Item 3) and secure by installing screw (Figure 2, Item 9).
41. Install relay panel (WP 0061, Remove/Install Relay Panel).
42. Install and adjust engine speed sensor (WP 0067, Remove/Install Engine Speed Sensor).
43. Install fuel tank (WP 0046, Remove/Install Fuel Tank).
44. Install interior body panels (WP 0035, Remove/Install Interior Body Panels).
45. Install left-side body panel (WP 0031, Remove/Install Left-side Body Panel).
46. Install right-side body panel (WP 0032, Remove/Install Right-side Body Panel).
47. Install rear body panel (WP 0030, Remove/Install Rear Body Panel).
48. Install front body panel (WP 0029, Remove/Install Front Body Panel).
49. Install DCS (WP 0017, Remove/Install DCS).
50. Install top body panel (WP 0028, Remove/Install Top Body Panel).
51. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
52. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
53. Start engine, check for proper operation, and repair as required. Apply 100% rated load to generator set for 30 min or until coolant reaches normal operating temperature (TM 9-6115-749-10).
54. Check all fluid levels and fill as required (TM 9-6115-749-10).

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

TEST AC GENERATOR

INITIAL SETUP:

Test Equipment

Load Bank (WP 0162, Table 2, Item 2)

Tools and Special Tools

Puller Set, Mechanical (WP 0162, Table 2, Item 21)
 Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
 Wrench, Torque, Click, Ratcheting, 3/8 in Drive, 75 ft•lb (WP 0162, Table 2, Item 41)
 Wrench, Torque, Dial, 1/4 in Drive, 30 in•lb (WP 0162, Table 2, Item 42)
 Wrench, Torque, Dial, 3/8 in Drive, 300 in•lb (WP 0162, Table 2, Item 43)

Materials/Parts

Bearing, rotor, 50/60 Hz (1) (WP 0121, Item 28)
 Bearing, rotor, 400 Hz (1) (WP 0122, Item 20)
 Exciter, rotor, 50/60 Hz (1) (WP 0121, Item 29)
 Exciter, rotor, 400 Hz (1) (WP 0122, Item 21)
 Nut, plain, assembled, 50/60 Hz (8) (WP 0121, Item 27)
 Nut, plain, assembled, 400 Hz (8) (WP 0122, Item 19)
 O-ring, 50/60 Hz (1) (WP 0121, Item 5)
 O-ring, 400 Hz (1) (WP 0122, Item 32)
 Rectifier, negative, 50/60 Hz (1) (WP 0121, Item 31)
 Rectifier, negative, 400 Hz (1) (WP 0122, Item 22)
 Rectifier, positive, 50/60 Hz (1) (WP 0121, Item 30)
 Rectifier, positive, 400 Hz (1) (WP 0122, Item 25)
 Resistor, voltage sensitive, 50/60 Hz (1) (WP 0121, Item 25)
 Resistor, voltage sensitive, 400 Hz (1) (WP 0122, Item 17)
 Stator, exciter, 50/60 Hz (1) (WP 0121, Item 7)
 Stator, exciter, 400 Hz (1) (WP 0122, Item 34)

Materials/Parts - cont'd

Washer, lock, 50/60 Hz (4) (WP 0121, Item 8)
 Washer, lock, 400 Hz (4) (WP 0122, Item 35)
 Washer, lock (9) (WP 0121, Item 20)
 Washer, lock, 50/60 Hz (4) (WP 0121, Item 32)
 Washer, lock, 400 Hz (4) (WP 0122, Item 24)
 Washer, lock (5) (WP 0122, Item 13)
 Cleaning compound, solvent (WP 0163, Table 1, Item 10)
 Rag, wiping (WP 0163, Table 1, Item 31)
 Tag, marker (WP 0163, Table 1, Item 35)

Personnel Required

91D (1)
 Assistant (1)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool
 Battery ground cable removed (WP 0036, Remove/Install Batteries)
 Left-side body panel removed (WP 0031, Remove/Install Left-side Body Panel)
 Right-side body panel removed (WP 0032, Remove/Install Right-side Body Panel)
 Rear body panel removed (WP 0030, Remove/Install Rear Body Panel)
 Interior bulkhead panel removed (WP 0035, Remove/Install Interior Body Panels)
 Fuel tank removed (WP 0046, Remove/Install Fuel Tank)
 Relay panel removed (WP 0061, Remove/Install Relay Panel)
 Voltage selection switch removed (WP 0054, Remove/Install Voltage Selection Switch)

TEST 50/60 HZ AC GENERATOR**NOTE**

This WP is for testing 50/60 and 400 Hz AC generators. The first part of the procedure is for 50/60 Hz AC generators and the second part is for 400 Hz AC generators.

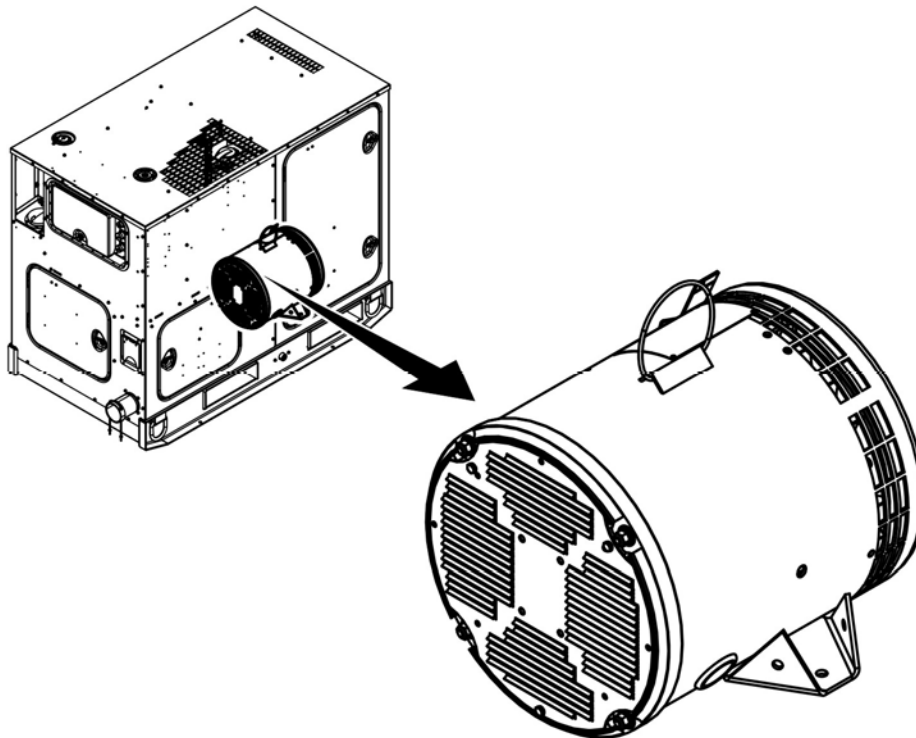
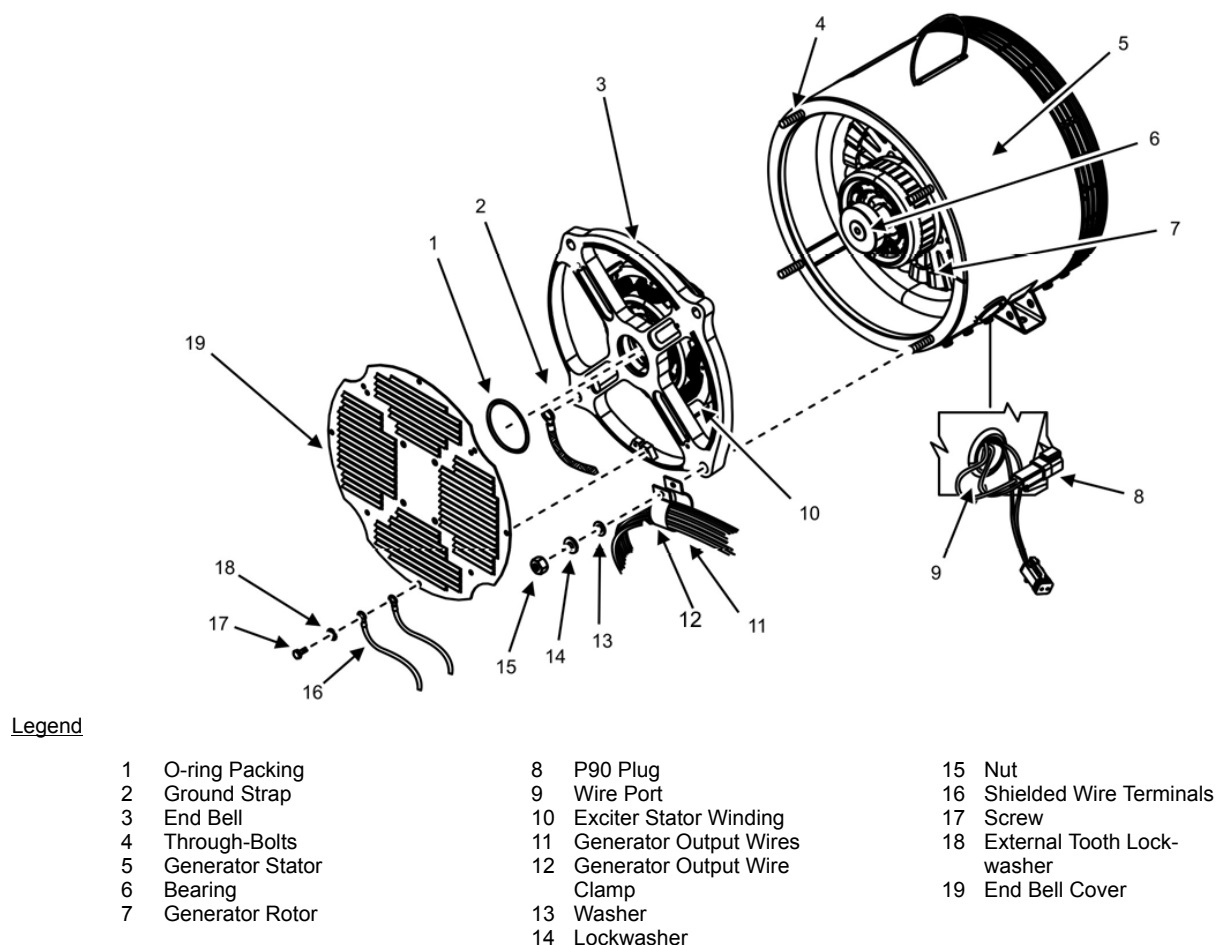
Remove End Bell

Figure 1. 50/60 Hz AC Generator - Location.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate AC generator on generator set skid (Figure 1).

TEST 50/60 HZ AC GENERATOR – CONTINUED

**Figure 2. 50/60 Hz Generator End Bell - Removal.**

3. Place tag or mark on end bell cover (Figure 2, Item 19) and end bell (Figure 2, Item 3) to note relative position of end bell cover (Figure 2, Item 19) to end bell (Figure 2, Item 3).
4. Note location of shielded wire terminals (Figure 2, Item 16) to aid with installation.
5. Remove three screws (Figure 2, Item 17) and three external tooth lockwashers (Figure 2, Item 18) that attach end bell cover (Figure 2, Item 19) and shielded wire terminals (Figure 2, Item 16) to end bell (Figure 2, Item 3).
6. Discard external tooth lockwashers (Figure 2, Item 18).
7. Set end bell cover (Figure 2, Item 19) aside on suitable work surface.
8. Place tag or mark on end bell (Figure 2, Item 3) and generator stator (Figure 2, Item 5) to note relative position of end bell (Figure 2, Item 3) to generator stator (Figure 2, Item 5).
9. Remove four nuts (Figure 2, Item 15), four washers (Figure 2, Item 13), and four lockwashers (Figure 2, Item 14) from through-bolts (Figure 2, Item 4).
10. Discard lockwashers (Figure 2, Item 14).
11. Note location of ground strap (Figure 2, Item 2) to aid with installation. Remove ground strap (Figure 2, Item 2).

TEST 50/60 HZ AC GENERATOR – CONTINUED

12. Note location of generator output wires (Figure 2, Item 11) and clamp (Figure 2, Item 12) to aid with installation. Remove generator output wires (Figure 2, Item 11) and clamp (Figure 2, Item 12).
13. Place tag or mark on P90 wiring plug (Figure 2, Item 8) wires to indicate the length that wires extend from generator stator (Figure 2, Item 5).
14. Disconnect P90 wiring plug (Figure 2, Item 8) at generator output wire clamp (Figure 2, Item 12).
15. Withdraw P90 wiring plug (Figure 2, Item 8) connected to the exciter stator winding (Figure 2, Item 10) through wire port in generator stator (Figure 2, Item 9).

CAUTION

End bell (Figure 2, Item 3) can be removed safely with a pry bar by applying force evenly and alternately to opposite sides of the end bell (Figure 2, Item 3). Failure to comply may cause damage to equipment.

CAUTION

Use extreme caution when removing end bell (Figure 2, Item 3) from generator stator (Figure 2, Item 5). End bell (Figure 2, Item 3) is awkward to handle while using tools to remove and must be removed without any exciter stator (Figure 2, Item 10) contact with the generator rotor (Figure 2, Item 7). Failure to comply will cause damage to equipment.

NOTE

Assistance is required to perform Step 16.

16. Remove end bell (Figure 2, Item 3) and exciter stator (Figure 2, Item 10) and place on a suitable work surface.
17. Remove O-ring packing (Figure 2, Item 1) from end bell (Figure 2, Item 3) and discard.
18. Inspect end bell cover (Figure 2, Item 19), end bell (Figure 2, Item 3), and exciter stator (Figure 2, Item 10) for signs of metal fractures or fatigue, damaged threads, loose or broken wires, damaged insulation, excessive heat, and/or odor of burned insulation. Replace as required.

END OF TASK**Test Exciter Stator Winding**

1. Select ohms resistance function on multimeter (Figure 3, Item 4).
2. Touch either meter probe (Figure 3, Item 3 or 5) to either pin (Figure 3, Item 2 or 6) of P90 wiring plug (Figure 3, Item 1).
3. Touch second meter probe (Figure 3, Item 3 or 5) to second pin (Figure 3, Item 2 or 6) of P90 wiring plug (Figure 3, Item 1).

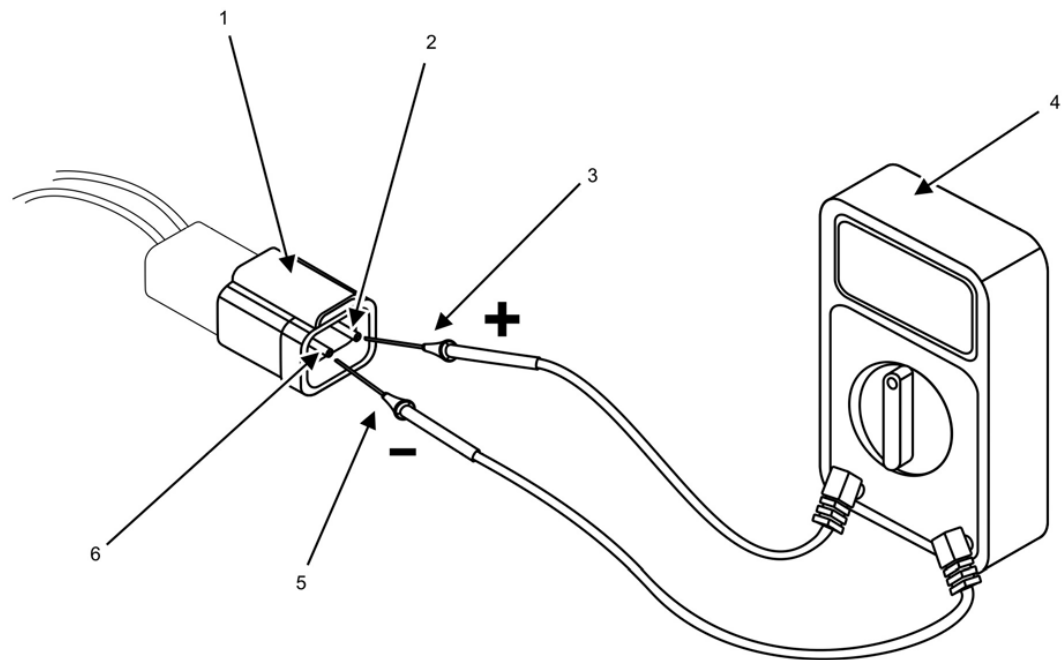
TEST 50/60 HZ AC GENERATOR – CONTINUED

Figure 3. Test 50/60 Hz Exciter Stator Winding - Detail.

4. Observe and record value of resistance.
5. Touch either meter probe (Figure 3, Item 3 or 5) to either pin (Figure 3, Item 2 or 6) of P90 wiring plug (Figure 3, Item 1).
6. Touch second meter probe (Figure 3, Item 3 or 5) to a bare metal area (ground) of exciter stator (Figure 2, Item 10).
7. Observe and record value of insulation resistance.

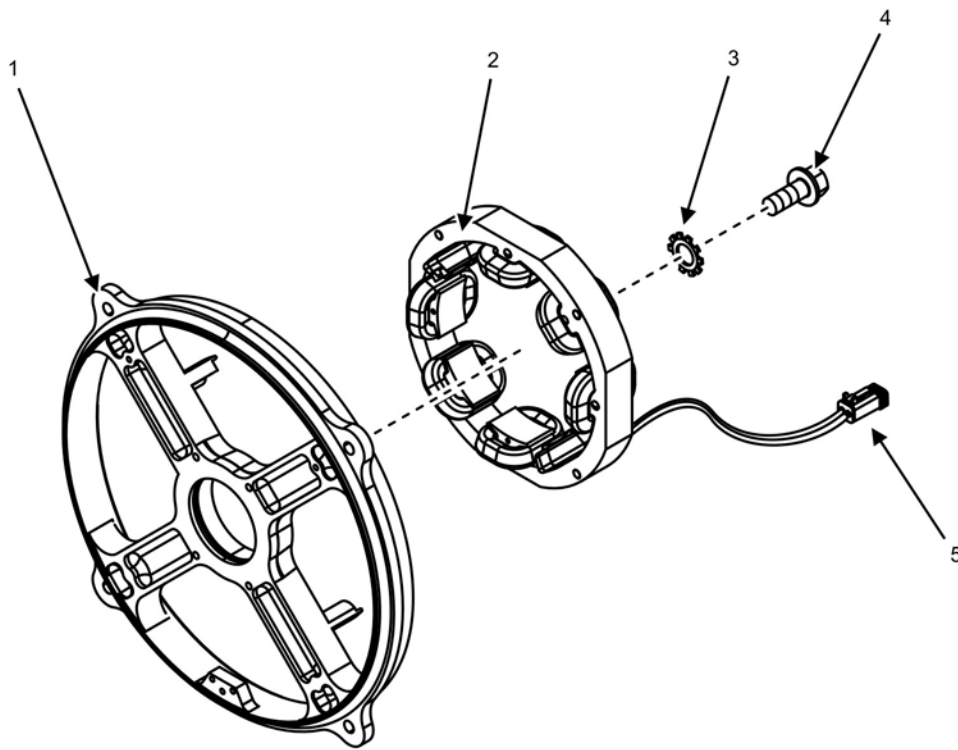
NOTE

Resistance value of exciter stator (Figure 2, Item 10) winding obtained in Step 4 should be $12.24 \Omega \pm 10\%$. Resistance value of zero indicates a shorted exciter stator (Figure 2, Item 10) winding, and a resistance value of infinity indicates an open exciter stator (Figure 2, Item 10) winding.

Insulation resistance value of exciter stator (Figure 2, Item 10) winding to ground obtained in Step 7 should be at least 1 M Ω .

8. Compare resistance values obtained in Step 4 and Step 7 to specifications to determine if exciter stator (Figure 2, Item 10) is serviceable.
 - a. Proceed to Replace Exciter Stator task if Step 8 indicates that exciter stator (Figure 2, Item 10) is not serviceable.
 - b. Set end bell (Figure 2, Item 3) and exciter stator (Figure 2, Item 10) aside for installation if serviceable.

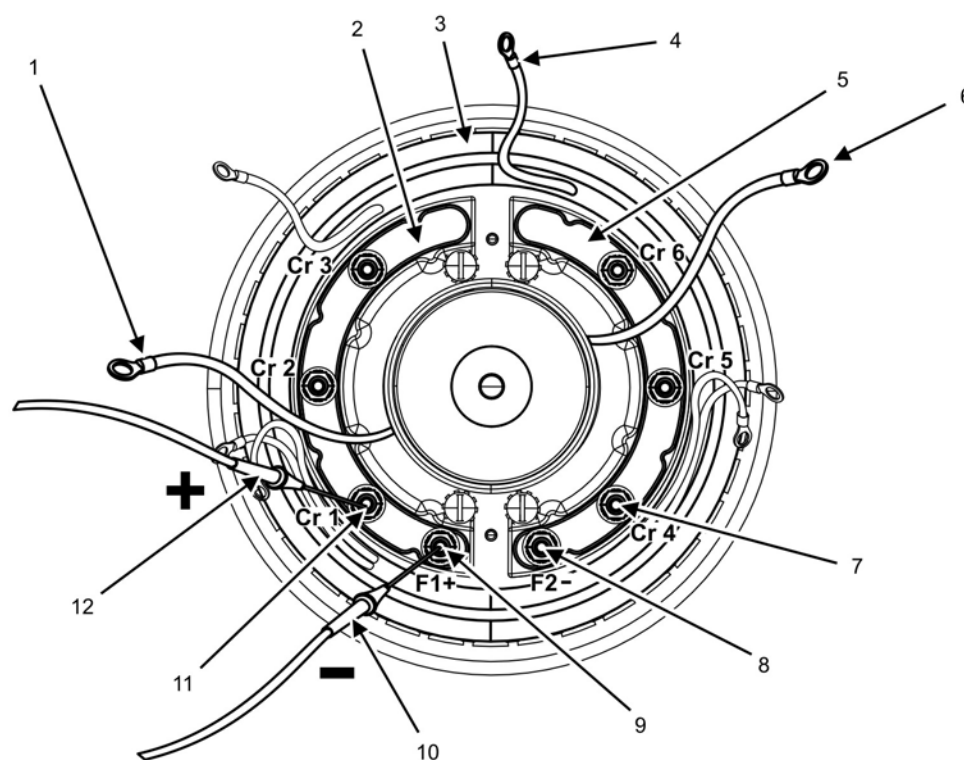
END OF TASK

TEST 50/60 HZ AC GENERATOR – CONTINUED**Replace Exciter Stator****Figure 4. 50/60 Hz Exciter Stator - Removal.**

1. Note orientation of P90 wiring plug (Figure 4, Item 5) to aid with installation.
2. Remove four bolts (Figure 4, Item 4) and four lockwashers (Figure 4, Item 3) that attach exciter stator (Figure 4, Item 2) to end bell (Figure 4, Item 1).
3. Discard lockwashers (Figure 4, Item 3).
4. Remove exciter stator (Figure 4, Item 2) from end bell (Figure 4, Item 1).
5. Examine machined surface of end bell (Figure 4, Item 1) for corrosion, dirt, and debris where exciter stator (Figure 4, Item 2) makes contact. Clean as required.
6. Perform Test Exciter Stator Winding task on new excite stator (Figure 4, Item 2).
7. Visually examine mating surface of new exciter stator (Figure 4, Item 2) where it will contact end bell (Figure 4, Item 1).
8. Remove any material from the surface of exciter stator (Figure 4, Item 2) that will interfere with mating surfaces of end bell (Figure 4, Item 1).
9. Place exciter stator (Figure 4, Item 2) onto end bell (Figure 4, Item 1) using correct P90 wiring plug (Figure 4, Item 5) orientation noted in Step 1.
10. Align holes in exciter stator (Figure 4, Item 2) with matching holes in end bell (Figure 4, Item 1).
11. Position four bolts (Figure 4, Item 4) and four new lockwashers (Figure 4, Item 3) to attach exciter stator (Figure 4, Item 2) to end bell (Figure 4, Item 1).
12. Torque four bolts (Figure 4, Item 4) to ft•lb (10 N•m).
13. Set end bell (Figure 4, Item 1) and exciter stator (Figure 4, Item 2) aside for installation.

TEST 50/60 HZ AC GENERATOR – CONTINUED**END OF TASK****Inspect Rectifier and Surge Suppressor**

1. Inspect rectifier plates (Figure 5, Items 2 and 5) for signs of corrosion, heat, or other damage. Replace as required.
2. Inspect surge suppressor (Figure 6, Item 6) for signs of corrosion, heat, or other damage. Replace as required.

END OF TASK**Test Rectifier****Figure 5. Test 50/60 Hz Rectifier and Generator Rotor.****CAUTION**

Both F1+ and F2- rectifier plates (Figure 5, Items 2 and 5) must be replaced if either rectifier plate (Figure 5, Items 2 or 5) or any diode fails testing. Failure to comply may cause damage to equipment.

CAUTION

If F1+ and F2- rectifier plates (Figure 5, Items 2 and 5) and Cr1 through Cr6 diodes are not marked as shown in Figure 5, it is imperative that each is identified before it is removed and marked or tagged according to Figure 5. Failure to comply may cause damage to equipment.

1. Mark or tag orientation of each rectifier plate (Figure 5, Items 2 and 5).

TEST 50/60 HZ AC GENERATOR – CONTINUED

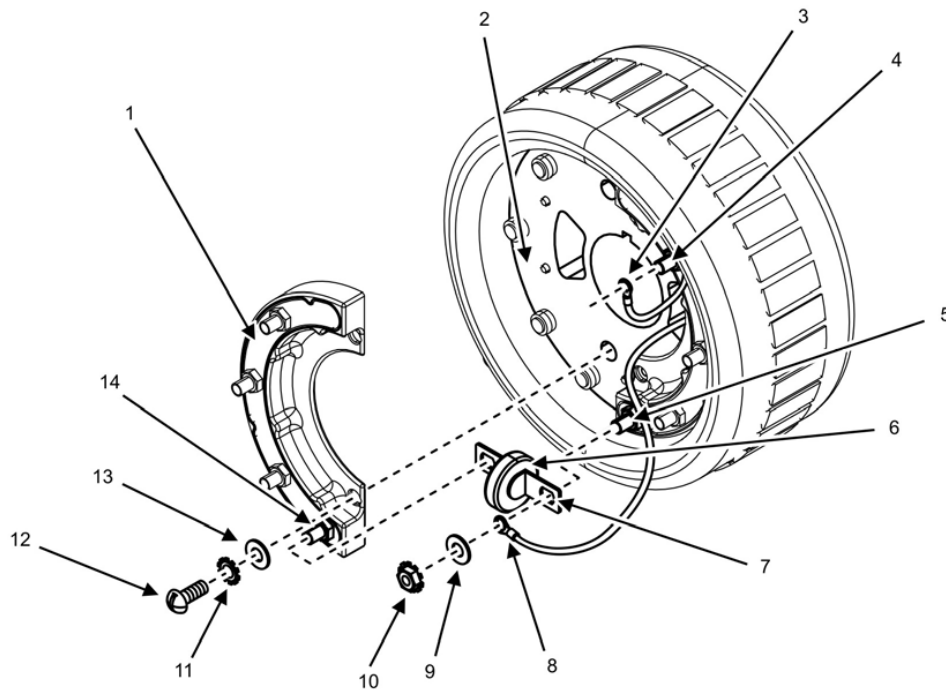


Figure 6. 50/60 Hz Rectifier Removal - Detail.

2. Mark or tag each wire (Figure 6, Items 3 and 8) as it is removed from diode (Figure 6, Item 4) and terminal studs (Figure 6, Item 5) to aid with installation.
3. Remove nut with captive lockwasher (Figure 6, Item 10) and flat washer (Figure 6, Item 9) from F1+ terminal stud (Figure 6, Item 14).
4. Remove nut with captive lockwasher (Figure 6, Item 10) and flat washer (Figure 6, Item 9) from F2- terminal stud (Figure 6, Item 5).
5. Discard two nuts with captive lockwashers (Figure 6, Item 10).
6. Remove surge suppressor (Figure 6, Item 6) and place on suitable surface for testing.
7. Remove F1+ generator rotor wire (Figure 5, Item 1) from F1+ terminal (Figure 5, Item 9).
8. Remove F2- generator rotor wire (Figure 5, Item 6) from F2- terminal (Figure 5, Item 8).
9. Remove nut with captive lockwasher (Figure 6, Item 10), flat washer (Figure 6, Item 9), and exciter rotor wire (Figure 5, Item 4) from diode CR1 (Figure 5, Item 11).
10. Repeat Step 9 for remaining diodes.
11. Discard six nuts with captive lockwashers (Figure 6, Item 10).
12. Select ohms resistance function on multimeter (Figure 3, Item 4).
13. Touch negative meter probe (Figure 5, Item 10) to F1+ terminal (Figure 5, Item 9) and positive meter probe (Figure 5, Item 12) to diode CR1 (Figure 5, Item 11). Observe and record resistance value.
14. Touch positive meter probe (Figure 5, Item 12) to F1+ terminal (Figure 5, Item 9) and negative meter probe (Figure 5, Item 10) to diode CR1 (Figure 5, Item 11). Observe and record resistance value.
15. Repeat Steps 13 and 14 for remaining diodes of F1+ rectifier plate (Figure 5, Item 2).
16. Touch negative meter probe (Figure 5, Item 10) to F2- terminal (Figure 5, Item 8) and positive meter probe (Figure 5, Item 12) to diode CR4 (Figure 5, Item 7). Observe and record resistance value.

TEST 50/60 HZ AC GENERATOR – CONTINUED

17. Touch positive meter probe (Figure 5, Item 12) to F2- terminal (Figure 5, Item 8) and negative meter probe (Figure 5, Item 10) to diode CR4 (Figure 5, Item 7). Observe and record resistance value.
18. Repeat Steps 16 and 17 for remaining diodes of F2- rectifier plate (Figure 5, Item 5).

NOTE

Resistance value obtained in Step 13 and Step 17 should be $2.74 \text{ M}\Omega \pm 10\%$ and the resistance value obtained in Step 14 and Step 16 should be greater than $27 \text{ M}\Omega$.

Resistance value obtained in Step 14 and Step 16 will typically be infinite resistance.

19. Compare resistance values obtained in Steps 13 through 18 to specifications to determine if rectifier plates (Figure 5, Items 2 and 5) are serviceable.

NOTE

Rectifier plates (Figure 5, Items 2 and 5) may remain attached to exciter rotor (Figure 6, Item 2) unless further tests reveal the need to remove rectifier plates (Figure 5, Items 2 and 5).

20. Proceed to Test Surge Suppressor task if rectifier is serviceable.
21. Proceed to Replace Rectifier task if rectifier is not serviceable.

END OF TASK**Test Surge Suppressor**

1. Select ohms resistance function on multimeter (Figure 3, Item 4).
2. Touch positive meter probe (Figure 3, Item 3) to either connection point (Figure 6, Item 7) of surge suppressor (Figure 6, Item 6).
3. Touch negative meter probe (Figure 3, Item 5) to opposite connection point of surge suppressor (Figure 6, Item 6). Observe and note resistance value.
4. Reverse the points of contact with meter probes (Figure 3, Items 3 and 5). Observe and note resistance value.

NOTE

Resistance value of surge suppressor (Figure 6, Item 6) should be equal when measured front-to-back and back-to-front. An acceptable value is greater than $1 \text{ M}\Omega$ and measured value will typically be infinite resistance.

5. Compare resistance values obtained in Step 3 and Step 4 to specifications to determine if surge suppressor (Figure 6, Item 6) is serviceable.
6. Set surge suppressor (Figure 6, Item 6) aside for installation if serviceable or replace as required.

END OF TASK**Replace Rectifier**

1. Remove two screws (Figure 6, Item 12), two lockwashers (Figure 6, Item 11), two flat washers (Figure 6, Item 13), and F1+ rectifier plate (Figure 5, Item 2) from exciter rotor (Figure 5, Item 3).
2. Discard lockwashers (Figure 6, Item 11).
3. Repeat Steps 1 and 2 for F2- rectifier plate (Figure 5, Item 5).
4. Inspect mounting surface of exciter rotor (Figure 5, Item 3) where rectifier plates (Figure 5, Items 2 and 5) were attached and clean as required.

TEST 50/60 HZ AC GENERATOR – CONTINUED

5. Perform Test Rectifier task, Steps 12 through 19 on replacement rectifier plates (Figure 5, Items 2 and 5).
6. Align holes in F1+ rectifier plate (Figure 5, Item 2) with holes in exciter rotor (Figure 5, Item 3) using orientation noted in Test Rectifier task, Step 1.
7. Install two screws (Figure 6, Item 12), two new lockwashers (Figure 6, Item 11), and two flat washers (Figure 6, Item 13) to attach F1+ rectifier plate (Figure 6, Item 1) to exciter rotor (Figure 6, Item 2).
8. Repeat Steps 7 and 8 for F2- rectifier plate (Figure 5, Item 5).

END OF TASK**Test Exciter Rotor Winding****NOTE**

Exciter rotor wires (Figure 5, Item 4) are paired according to a specific order. The order of pairs is Cr1 to Cr4, Cr2 to Cr5, and Cr3 to Cr6.

1. Identify each of six numbered exciter rotor wire (Figure 5, Item 4) terminals.
2. Select ohms resistance function on multimeter (Figure 3, Item 4).
3. Touch either meter probe (Figure 3, Item 3 or 5) to exciter rotor wire (Figure 5, Item 4) terminal identified as CR1.
4. Touch second meter probe (Figure 3, Items 3 or 5) to exciter rotor wire (Figure 5, Item 4) terminal identified as Cr4.
5. Observe and record value of resistance.
6. Repeat Steps 3 through 5 for remaining ordered pairs of exciter rotor wires (Figure 5, Item 4).
7. Touch either meter probe (Figure 3, Item 3 or 5) to exciter rotor wire (Figure 5, Item 4) terminal tagged or marked as CR1.
8. Touch second meter probe to bare metal area (ground) of exciter rotor (Figure 5, Item 3).
9. Observe and record value of resistance.
10. Repeat Steps 7 through 9 for remaining exciter rotor wires (Figure 5, Item 4) terminals tagged or marked as Cr 2 and Cr3.

NOTE

Resistance values obtained in Steps 3 through 6 should be $0.5 \Omega \pm 10\%$. Accuracy of a multimeter is unreliable when measuring values lower than 1Ω . A measurement value greater than 1Ω or with a $\pm 10\%$ variance for any pair of wires indicates a defective exciter rotor (Figure 5, Item 3).

Resistance values obtained in Step 7 through 10 of each wire to ground should be at least $1 \text{ M}\Omega$.

11. Compare the resistance values obtained in Steps 3 through 6 and Steps 7 through 10 to specifications to determine if exciter rotor (Figure 5, Item 3) is serviceable.
12. Proceed to Test Generator Rotor Winding task if exciter rotor (Figure 5, Item 3) is serviceable or replace as required.

END OF TASK**Test Generator Rotor Winding**

1. Identify generator rotor wires tagged or marked F1+ generator rotor wire (Figure 5, Item 1) and F2- generator rotor wire (Figure 5, Item 6).

TEST 50/60 HZ AC GENERATOR – CONTINUED

2. Select ohms resistance function on multimeter (Figure 3, Item 4).
3. Touch either meter probe (Figure 3, Item 3 or 5) to F1+ generator rotor wire (Figure 5, Item 1) terminal.
4. Touch second meter probe (Figure 3, Items 3 or 5) to F2- generator rotor wire (Figure 5, Item 6) terminal.
5. Observe and record value of resistance.
6. Touch either meter probe (Figure 3, Item 3 or 5) to F1+ generator rotor wire (Figure 5, Item 1) terminal.
7. Touch second meter probe (Figure 3, Item 3 or 5) to bare metal area (ground) of generator rotor (Figure 2, Item 7).
8. Observe and record value of resistance.

NOTE

Resistance value obtained in Steps 3 through 5 should be $2.10 \Omega \pm 10\%$. Resistance value of infinity indicates an open generator rotor (Figure 2, Item 7) winding and resistance value of zero indicates a shorted generator rotor (Figure 2, Item 7) winding.

Resistance value obtained in Steps 6 through 8 of generator rotor (Figure 2, Item 7) winding to ground should be at least 1 M Ω .

9. Compare the resistance values obtained in Steps 3 through 5 and Steps 6 through 8 to specifications to determine if generator rotor (Figure 2, Item 7) is serviceable.
10. Proceed to Test Generator Stator Winding task if generator rotor (Figure 2, Item 7) is serviceable.

END OF TASK**Test Generator Stator Winding**

1. Identify each of the 12 numbered generator output wires (Figure 2, Item 11) removed from voltage selection switch in WP 0054, Remove/Install Voltage Selection Switch using imprinted wire markers.

NOTE

Generator stator winding output wires (Figure 2, Item 11) are paired according to a specific order. The order of pairs is: T1 - T4, T2 - T5, T3 - T6, T7 - T10, T8 - T11, and T9 - T12.

2. Arrange wires into ordered pairs.
3. Select ohms resistance function on multimeter (Figure 3, Item 4).
4. Touch either meter probe (Figure 3, Item 3 or 5) to generator output wire terminal marked T1.
5. Touch second meter probe (Figure 3, Item 3 or 5) to generator output wire terminal marked T4.
6. Observe and record value of resistance.
7. Repeat Steps 4 through 6 for the remaining ordered pairs of wires.
8. Touch either meter probe (Figure 3, Item 3 or 5) to generator output wire marked T1.
9. Touch second meter probe (Figure 3, Item 3 or 5) to bare metal area (ground) of generator stator (Figure 2, Item 5).
10. Observe and record value of resistance.
11. Repeat Steps 8 through 10 for generator output wire terminals marked T2, T3, T7, T8, and T9.

NOTE

Resistance values obtained in Steps 4 through 7 should be $0.2557 \Omega \pm 10\%$. Accuracy of a multimeter is unreliable when measuring values lower than 1 Ω . A measurement value greater than 1 Ω or with a $\pm 10\%$ variance for any pair of wires indicates a defective generator stator (Figure 2, Item 5).

TEST 50/60 HZ AC GENERATOR – CONTINUED

Resistance values obtained in Steps 8 through 11 of each wire to ground should be at least 1 M Ω .

12. Compare resistance values obtained in Steps 4 through 7 and Steps 8 through 11 to specifications to determine if generator stator (Figure 2, Item 5) is serviceable.

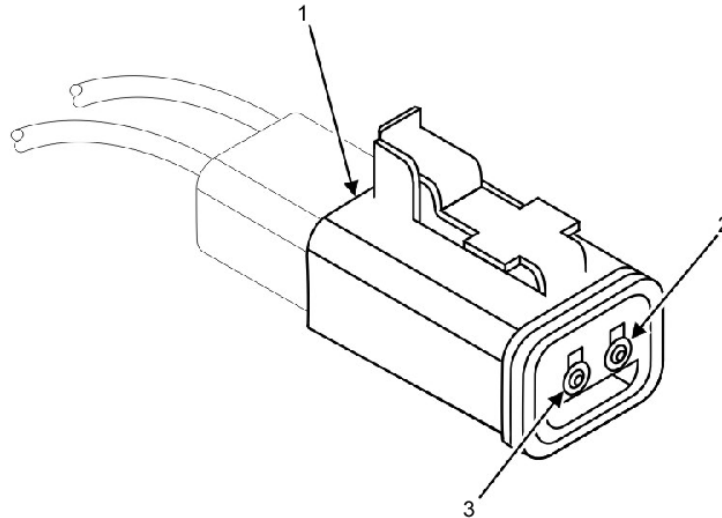


Figure 7. Test 50/60 Hz Generator Stator Q1/Q2 Winding - Detail.

13. Locate and disconnect Q1/Q2 wiring plug (Figure 7, Item 1) at wire port in generator stator (Figure 2, Item 9).
14. Select ohms resistance function on multimeter (Figure 3, Item 4).
15. Touch either meter probe (Figure 3, Item 3 or 5) to either wiring plug (Figure 7, Item 1) connector (Figure 7, Item 2 or 3).
16. Touch second meter probe (Figure 3, Item 3 or 5) to second wiring plug (Figure 7, Item 1) connector (Figure 7, Item 2 or 3).
17. Observe and record value of resistance.
18. Touch either meter probe (Figure 3, Item 3 or 5) to either wiring plug (Figure 7, Item 1) connector (Figure 7, Item 2 or 3).
19. Touch second meter probe (Figure 3, Item 3 or 5) to bare metal area (ground) of generator stator (Figure 2, Item 5).
20. Observe and record value of resistance.

NOTE

Resistance value obtained in Steps 15 through 17 should be 1.013 Ω $\pm$ 10%.

Resistance value obtained in Steps 18 through 20 to ground should be at least 1 M Ω .

21. Compare the resistance values obtained in Steps 15 through 17 and Steps 18 through 20 to specifications to determine if generator stator (Figure 2, Item 5) is serviceable.

END OF TASK

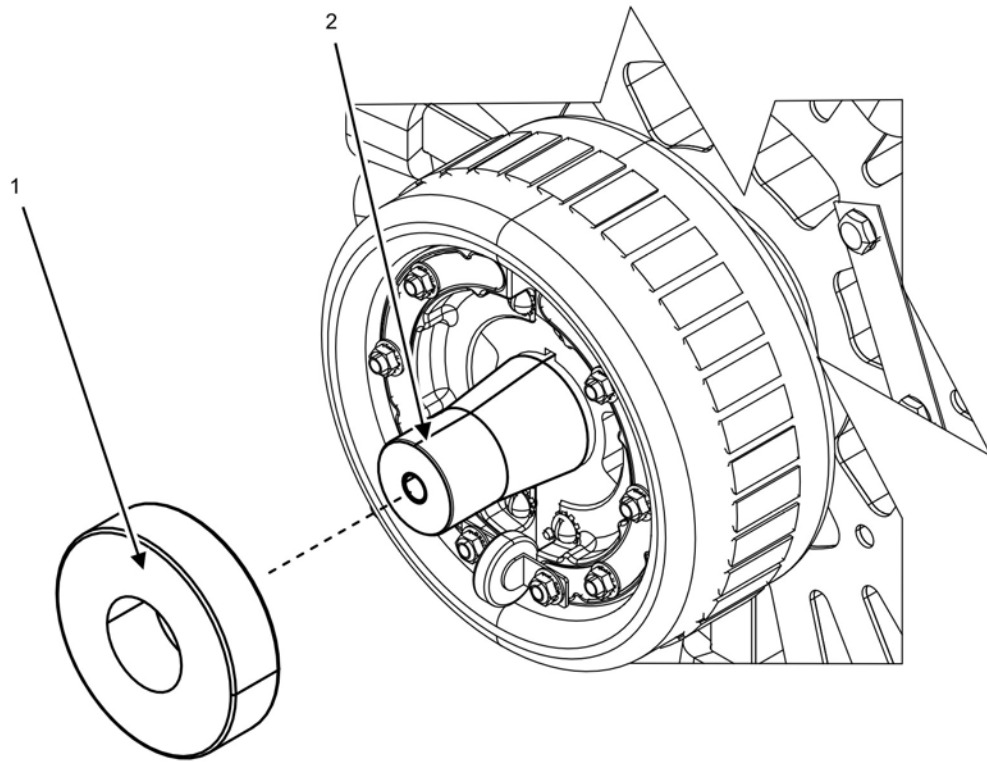
TEST 50/60 HZ AC GENERATOR – CONTINUED**Inspect Bearing**

Figure 8. 50/60 Hz Generator Bearing Removal - Detail.

1. Examine bearing (Figure 8, Item 1) for discoloration and corrosion that are signs of heat and contamination damage.
2. Touch outer race of bearing (Figure 8, Item 1) lightly with fingertips and rotate slowly in a back-and-forth motion to feel and listen for any signs of roughness and/or lack of lubrication.
3. Proceed to Replace Bearing task if any signs of damage are found or if bearing (Figure 8, Item 1) does not rotate freely.

END OF TASK**Replace Bearing**

1. Attach bearing puller to bearing (Figure 8, Item 1).

CAUTION

When a bearing is removed for any reason, always install a new bearing (Figure 8, Item 1). Failure to comply may cause damage to equipment.

2. Remove bearing (Figure 8, Item 1) from generator rotor shaft (Figure 8, Item 2).
3. Clean bearing surface of generator rotor shaft (Figure 8, Item 2).
4. Press new bearing (Figure 8, Item 1) onto generator rotor shaft (Figure 8, Item 2).

END OF TASK

TEST 50/60 HZ AC GENERATOR – CONTINUED**Install End Bell**

1. Perform Test Surge Suppressor task on new surge suppressor (Figure 6, Item 6).
2. Place surge suppressor (Figure 6, Item 6) onto F1+ terminal (Figure 5, Item 9) and F2- terminal (Figure 5, Item 8).
3. Place F1+ generator rotor wire (Figure 5, Item 1) onto F1+ terminal (Figure 5, Item 9).
4. Install flat washer (Figure 6, Item 9) and new nut with captive lockwasher (Figure 6, Item 10) onto F1+ terminal (Figure 5, Item 9).
5. Place F2- generator rotor wire (Figure 5, Item 6) onto F2- terminal (Figure 5, Item 8).
6. Install flat washer (Figure 6, Item 9) and new nut with captive lockwasher (Figure 6, Item 10) onto F2- terminal (Figure 5, Item 8).
7. Place exciter rotor wire (Figure 5, Item 4) tagged or marked Cr1 onto diode tagged or marked Cr1 (Figure 5, Item 11).
8. Install flat washer (Figure 6, Item 9) and new nut with captive lockwasher (Figure 6, Item 10) onto diode tagged or marked Cr1 (Figure 5, Item 11).
9. Repeat Steps 7 through 8 for remaining exciter rotor wires (Figure 5, Item 4) and diodes (Figure 6, Item 4).
10. Remove tags or marks that will interfere with generator operation.
11. Install new O-ring packing (Figure 2, Item 1) into end bell (Figure 2, Item 3).
12. Insert P90 wiring plug (Figure 2, Item 8) through wire port of generator stator (Figure 2, Item 9).

CAUTION

Use extreme caution when installing end bell (Figure 2, Item 3) onto generator stator (Figure 2, Item 5). End bell (Figure 2, Item 3) is awkward to handle and must be installed without any exciter stator (Figure 2, Item 10) contact with generator rotor (Figure 2, Item 7). Failure to comply will cause damage to equipment.

13. Align tag or mark on end bell (Figure 2, Item 3) with corresponding tag or mark on generator stator (Figure 2, Item 5).
14. Push end bell (Figure 2, Item 3) mating surface evenly into matching machined surface of generator stator (Figure 2, Item 5).

NOTE

End bell (Figure 2, Item 3) may resist installation onto bearing (Figure 2, Item 6). Use a tool that will not damage end bell (Figure 2, Item 3) to tap various points around outside of bearing mating surface until end bell (Figure 2, Item 3) machined surface makes contact with generator stator (Figure 2, Item 5) machined surface.

15. Examine area between end bell (Figure 2, Item 3) machined surface and generator stator (Figure 2, Item 5) machined surface to ensure distance is even.
16. Install four washers (Figure 2, Item 13) and four nuts (Figure 2, Item 15) without lockwashers (Figure 2, Item 14) onto through-bolts (Figure 2, Item 4).
17. Tighten each nut (Figure 2, Item 15) gradually in crisscross sequence using the same number of turns each time for each nut (Figure 2, Item 15) to draw end bell (Figure 2, Item 3) onto generator stator (Figure 2, Item 5).
18. Verify end bell (Figure 2, Item 3) machined surface has fully engaged generator stator (Figure 2, Item 5) machined surface.
19. See Remove End Bell task, Steps 9, 13, and 14 if end bell (Figure 2, Item 3) machined surface does not fully engage generator stator (Figure 2, Item 5) machined surface. Repeat Steps 14 through 19 as required.

TEST 50/60 HZ AC GENERATOR – CONTINUED

20. Loosen four nuts (Figure 2, Item 15) that attach end bell (Figure 2, Item 3) to generator stator (Figure 2, Item 5) 1/2 - 3/4 turn.
21. Remove lower two nuts (Figure 2, Item 15) and two washers (Figure 2, Item 13) that attach end bell (Figure 2, Item 3) to generator stator (Figure 2, Item 5).
22. Install ground strap (Figure 2, Item 2) according to location noted in Remove End Bell task, Step 11.
23. Install generator output wires (Figure 2, Item 11) and clamp (Figure 2, Item 12) according to location noted in Remove End Bell task, Step 12.
24. Install two washers (Figure 2, Item 13), two new lockwashers (Figure 2, Item 14), and two nuts (Figure 2, Item 15) onto lower two through-bolts (Figure 2, Item 4).
25. Remove upper two nuts (Figure 2, Item 15) and two washers (Figure 2, Item 13) that attach end bell (Figure 2, Item 3) to generator stator (Figure 2, Item 5).
26. Install two washers (Figure 2, Item 13), two new lockwashers (Figure 2, Item 14), and two nuts (Figure 2, Item 15) onto upper two through-bolts (Figure 2, Item 4).
27. Torque four nuts (Figure 2, Item 15) to 28-32 ft•lb (38-43 N•m).
28. Remove tags or marks that will interfere with generator operation.
29. Pull excess P90 wiring plug (Figure 2, Item 8) wire from generator stator (Figure 2, Item 9) at wire port to length tagged or marked in Remove End Bell task, Step 13.
30. Align holes in end bell cover (Figure 2, Item 19) with matching holes in end bell (Figure 2, Item 3).
31. Install upper two screws (Figure 2, Item 17) and two new lockwashers (Figure 2, Item 18) to loosely attach end bell cover (Figure 2, Item 19) to end bell (Figure 2, Item 3).
32. Install screw (Figure 2, Item 17), new lockwasher (Figure 2, Item 18), and two shielded wire terminals (Figure 2, Item 16) according to location noted in Remove End Bell task, Step 4 into lower end bell cover (Figure 2, Item 19) hole.
33. Torque three screws (Figure 2, Item 17) to 20 in•lb (20.5 N•m).
34. Remove tags or marks that will interfere with generator operation.
35. Connect P90 wiring plug (Figure 2, Item 8) to connector (not shown) at generator output wire clamp (Figure 2, Item 12).
36. Install voltage selection switch (WP 0054, Remove/Install Voltage Selection Switch).
37. Install relay panel (WP 0061, Remove/Install Relay Panel).
38. Install fuel tank (WP 0046, Remove/Install Fuel Tank).
39. Install interior body panels (WP 0035, Remove/Install Interior Body Panels).
40. Install left-side body panel (WP 0031, Remove/Install Left-side Body Panel).
41. Install right-side body panel (WP 0032, Remove/Install Right-Side Body Panel).
42. Install rear body panel (WP 0030, Remove/Install Rear Body Panel).
43. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
44. Close generator set doors.
45. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
46. Start engine and check for proper operation. Bring coolant to normal operating temperature and then apply a 100% rated load for 30 minutes (TM 9-6115-749-10).
47. Repair as required.

END OF TASK**TEST 400 HZ AC GENERATOR****Remove End Bell**

1. Ensure equipment conditions are met in order presented in initial setup.

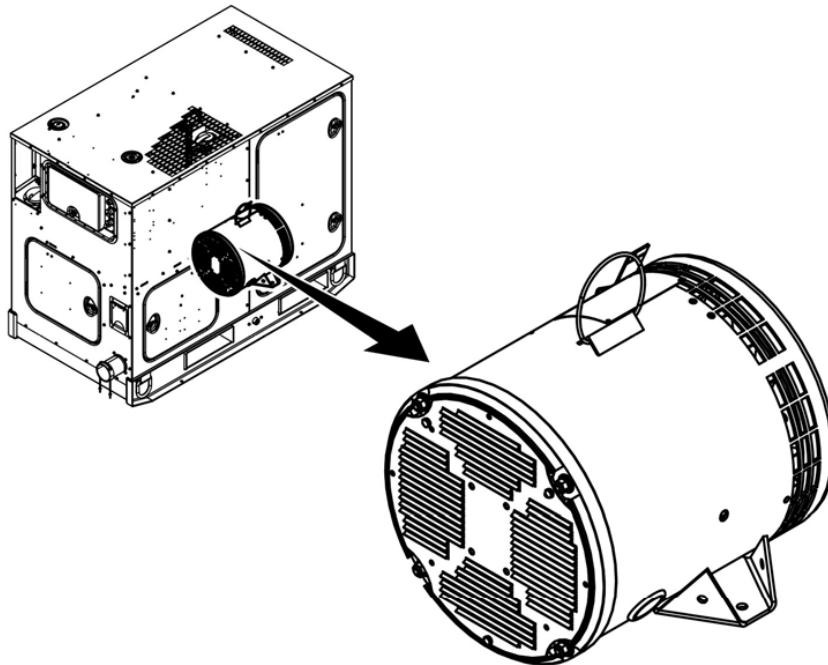
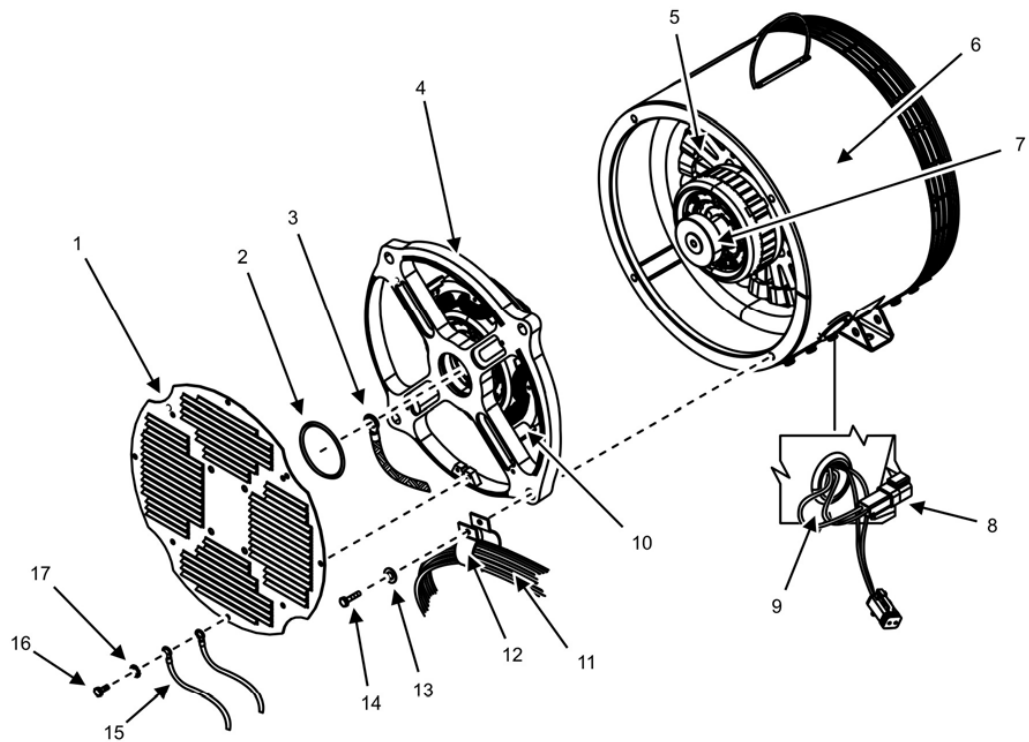


Figure 9. 400 Hz AC Generator - Location.

2. Locate AC generator on generator set skid (Figure 9).

TEST 400 HZ AC GENERATOR – CONTINUED

Legend

- | | | |
|--------------------|--------------------------------|-------------------------------|
| 1 End Bell Cover | 7 Bearing | 13 Washer |
| 2 O-ring Packing | 8 P90 Plug | 14 Bolt |
| 3 Ground Strap | 9 Wire Port | 15 Shielded Wire Terminals |
| 4 End Bell | 10 Exciter Stator Winding | 16 Screw |
| 5 Generator Rotor | 11 Generator Output Wires | 17 External Tooth Lock-washer |
| 6 Generator Stator | 12 Generator Output Wire Clamp | |

Figure 10. 400 Hz Generator End Bell - Removal.

3. Place tag or mark on end bell cover (Figure 10, Item 1) and end bell (Figure 10, Item 4) to note relative position of end bell cover (Figure 10, Item 1) to end bell (Figure 10, Item 4).
4. Note location of shielded wire terminals (Figure 10, Item 15) to aid with installation.
5. Remove three screws (Figure 10, Item 16) and three lockwashers (Figure 10, Item 17) that attach end bell cover (Figure 10, Item 1) and shielded wire terminals (Figure 10, Item 15) to end bell (Figure 10, Item 4).
6. Discard three lockwashers (Figure 10, Item 17).
7. Set end bell cover (Figure 10, Item 1) aside on suitable work surface for inspection.
8. Place tag or mark on end bell (Figure 10, Item 4) and generator stator (Figure 10, Item 6) to note relative position of end bell (Figure 10, Item 4) to generator stator (Figure 10, Item 6).
9. Note location of ground strap (Figure 10, Item 3) to aid with installation.
10. Note location of generator output wires (Figure 10, Item 11) and clamp (Figure 10, Item 12) to aid with installation.
11. Remove four bolts (Figure 10, Item 14) and four washers (Figure 10, Item 13) that attach end bell (Figure 10, Item 4) to generator stator (Figure 10, Item 6).

TEST 400 HZ AC GENERATOR – CONTINUED

12. Place tag or mark on P90 wiring plug (Figure 10, Item 8) wires to indicate the length that wires extend from generator stator (Figure 10, Item 6).
13. Disconnect P90 wiring plug (Figure 10, Item 8) located at generator output wire clamp (Figure 10, Item 12).
14. Withdraw P90 wiring plug (Figure 10, Item 8) connected to the exciter stator (Figure 10, Item 10) through wire port in generator stator (Figure 10, Item 9).

CAUTION

End bell (Figure 10, Item 4) can be removed safely with a pry bar by applying force evenly and alternately to opposite sides of the end bell (Figure 10, Item 4). Failure to comply may cause damage to equipment.

CAUTION

Use extreme caution when removing end bell (Figure 10, Item 4) from generator stator (Figure 10, Item 6). End bell (Figure 10, Item 4) is awkward to handle while using tools to remove and must be removed without any exciter stator (Figure 10, Item 10) contact with generator rotor (Figure 10, Item 5). Failure to comply will cause damage to equipment.

NOTE

Assistance is required to perform Step 15.

15. Remove end bell (Figure 10, Item 4) and exciter stator (Figure 10, Item 10) and place on a suitable work surface.
16. Remove O-ring packing (Figure 10, Item 2) from end bell (Figure 10, Item 4) and discard.
17. Inspect end bell cover (Figure 10, Item 1), end bell (Figure 10, Item 4), and exciter stator (Figure 10, Item 10) for signs of metal fractures or fatigue, damaged threads, loose or broken wires, damaged insulation, excessive heat, and/or odor of burned insulation. Replace as required.

END OF TASK**Test Exciter Stator Winding**

1. Select ohms resistance function on multimeter (Figure 11, Item 4).
2. Touch either meter probe (Figure 11, Item 3 or 5) to either pin (Figure 11, Item 2 or 6) of P90 wiring plug (Figure 11, Item 1).
3. Touch second meter probe (Figure 11, Item 3 or 5) to second pin (Figure 11, Item 2 or 6) of P90 wiring plug (Figure 11, Item 1).

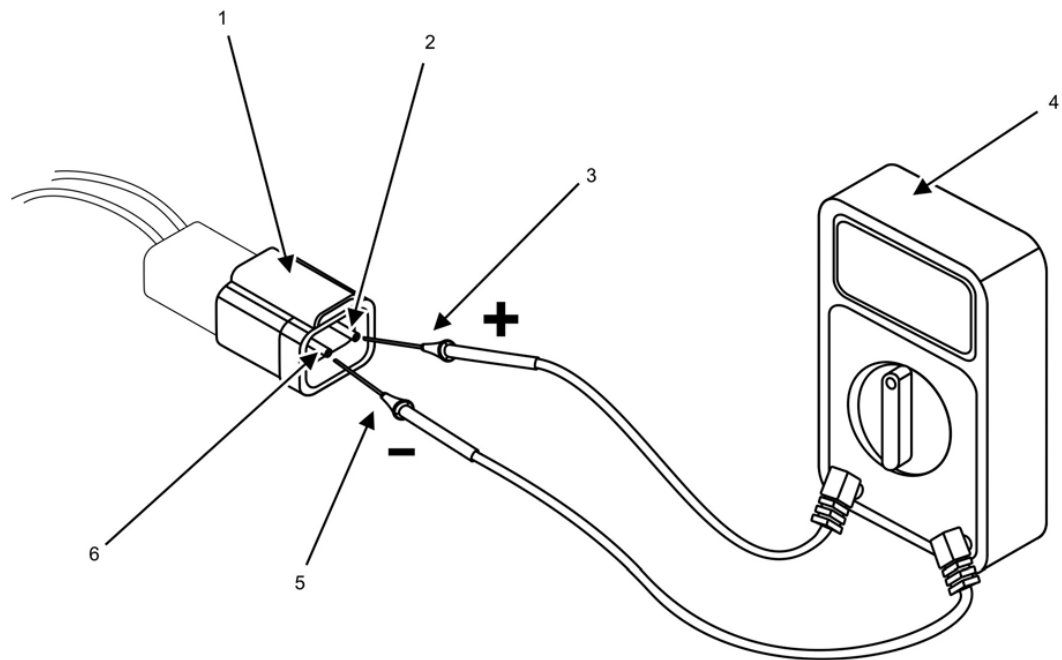
TEST 400 HZ AC GENERATOR – CONTINUED

Figure 11. Test 400 Hz Exciter Stator Winding - Detail.

4. Observe and record value of resistance.
5. Touch either meter probe (Figure 11, Item 3 or 5) to either pin (Figure 11, Item 2 or 6) of P90 wiring plug (Figure 11, Item 1).
6. Touch second meter probe (Figure 11, Item 3 or 5) to a bare metal area (ground) of exciter stator winding (Figure 10, Item 10) frame.
7. Observe and record value of insulation resistance.

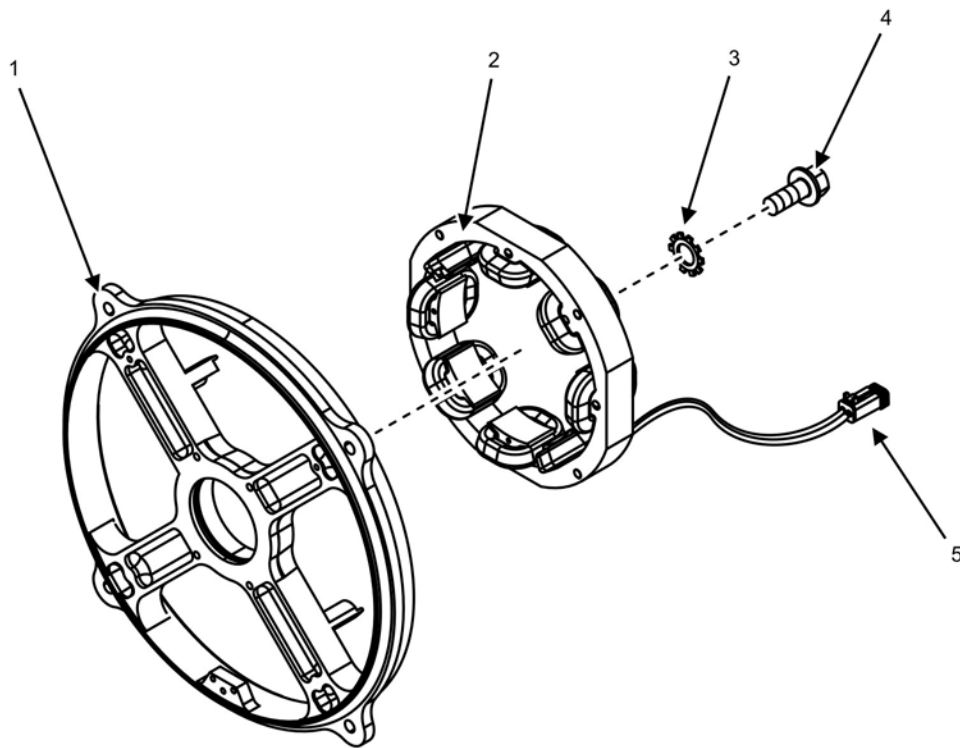
NOTE

Resistance value of exciter stator (Figure 10, Item 10) winding obtained in Step 4 should be $12.4 \Omega \pm 10\%$. A resistance value of zero indicates a shorted exciter stator (Figure 10, Item 10) winding, and a resistance value of infinity indicates an open exciter stator (Figure 10, Item 10) winding.

Insulation resistance value of exciter stator (Figure 10, Item 10) winding to ground obtained in Step 7 should be at least 1 M Ω .

8. Compare resistance values obtained in Step 4 and Step 7 to specifications to determine if exciter stator (Figure 10, Item 10) is serviceable.
 - a. Proceed to Replace Exciter Stator task if exciter stator (Figure 10, Item 10) winding is not serviceable.
 - b. Set end bell (Figure 10, Item 4) and exciter stator (Figure 10, Item 10) aside for installation if serviceable.

END OF TASK

TEST 400 HZ AC GENERATOR – CONTINUED**Replace Exciter Stator****Figure 12. 400 Hz Exciter Stator - Removal.**

1. Note orientation of P90 wiring plug (Figure 12, Item 5) to aid with installation.
2. Remove four bolts (Figure 12, Item 4) and four lockwashers (Figure 12, Item 3) that attach exciter stator (Figure 12, Item 2) to end bell (Figure 12, Item 1).
3. Discard four lockwashers (Figure 12, Item 3).
4. Remove exciter stator (Figure 12, Item 2) from end bell (Figure 12, Item 1).
5. Examine machined surface of end bell (Figure 12, Item 1) for corrosion, dirt, and debris where exciter stator (Figure 12, Item 2) makes contact. Clean as required.
6. Perform Test Exciter Stator Winding task on new exciter stator (Figure 12, Item 2).
7. Examine mating surface of new exciter stator (Figure 12, Item 2) visually where it will contact end bell (Figure 12, Item 1).
8. Remove any material from the surface of exciter stator (Figure 12, Item 2) that will interfere with mating surfaces of end bell (Figure 12, Item 1).
9. Place exciter stator (Figure 12, Item 2) onto end bell (Figure 12, Item 1) using correct P90 wiring plug (Figure 12, Item 5) orientation noted in Step 1.
10. Align holes in exciter stator (Figure 12, Item 2) with matching holes in end bell (Figure 12, Item 1).
11. Install four bolts (Figure 12, Item 4) and four new lockwashers (Figure 12, Item 3) to attach exciter stator (Figure 12, Item 2) to end bell (Figure 12, Item 1).
12. Torque four bolts (Figure 12, Item 4) to 8 ft•lb (10 N•m).
13. Set end bell (Figure 12, Item 1) and exciter stator (Figure 12, Item 2) aside for installation.

TEST 400 HZ AC GENERATOR – CONTINUED**END OF TASK****Inspect Rectifier and Surge Suppressor**

1. Inspect rectifier plates (Figure 13, Items 2 and 5) for signs of corrosion, heat, or other damage. Replace as required.
2. Inspect surge suppressor (Figure 14, Item 6) for signs of corrosion, heat, or other damage. Replace as required.

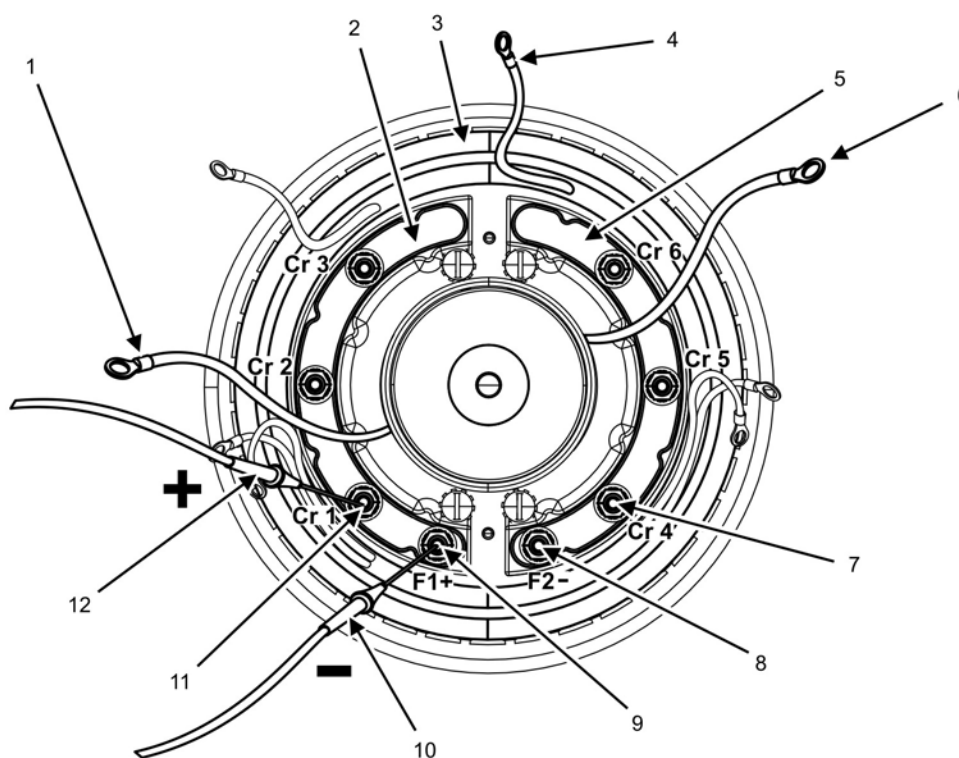
END OF TASK**Test Rectifier**

Figure 13. Test 400 Hz Rectifier and Generator Rotor.

CAUTION

Both F1+ and F2- rectifier plates (Figure 13, Items 2 and 5) must be replaced if either rectifier plate (Figure 13, Items 2 or 5) or any diode fails testing. Failure to comply may cause damage to equipment.

CAUTION

If the F1+ and F2- rectifier plates (Figure 13, Items 2 and 5) and Cr1 through Cr6 diodes are not marked as shown in Figure 13, it is imperative that each is identified before it is removed and marked or tagged according to Figure 13. Failure to comply may cause damage to equipment.

1. Mark or tag orientation of each rectifier plate (Figure 13, Items 2 and 5).

TEST 400 HZ AC GENERATOR – CONTINUED

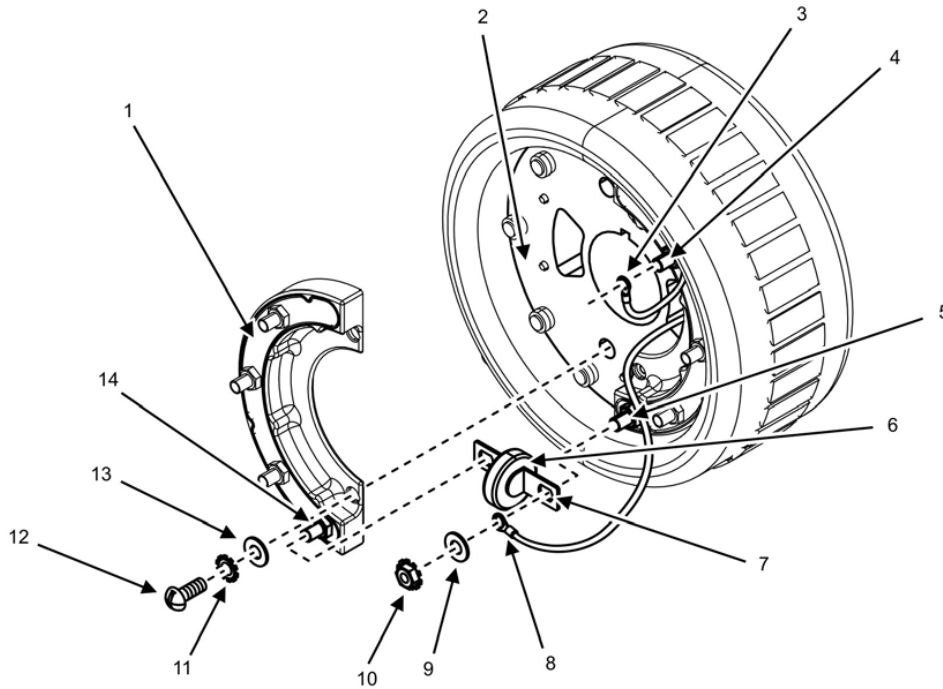


Figure 14. 400 Hz Rectifier Removal - Detail.

2. Mark or tag each wire (Figure 14, Items 3 and 8) as it is removed from diode (Figure 14, Item 4) and terminal studs (Figure 14, Item 5) to aid with installation.
3. Remove nut with captive lockwasher (Figure 14, Item 10) and flat washer (Figure 14, Item 9) from F1+ terminal stud (Figure 14, Item 14).
4. Remove nut with captive lockwasher (Figure 14, Item 10) and flat washer (Figure 14, Item 9) from F2- terminal stud (Figure 14, Item 5).
5. Discard two nuts with captive lockwashers (Figure 14, Item 10).
6. Remove surge suppressor (Figure 14, Item 6) and place on suitable surface for testing.
7. Remove F1+ generator rotor wire (Figure 13, Item 1) from F1+ terminal (Figure 13, Item 9).
8. Remove F2- generator rotor wire (Figure 13, Item 6) from F2- terminal (Figure 13, Item 8).
9. Remove nut with captive lockwasher (Figure 14, Item 10), flat washer (Figure 14, Item 9), and exciter rotor wire (Figure 13, Item 4) from diode CR1 (Figure 13, Item 11).
10. Repeat Steps 8 through 9 for remaining diodes.
11. Discard six nuts with lockwashers (Figure 14, Item 10).
12. Select ohms resistance function on multimeter (Figure 11, Item 4).
13. Touch negative meter probe (Figure 13, Item 10) to F1+ terminal (Figure 13, Item 9) and positive meter probe (Figure 13, Item 12) to diode CR1 (Figure 13, Item 11). Observe and record resistance value.
14. Touch positive meter probe (Figure 13, Item 12) to F1+ terminal (Figure 13, Item 9) and negative meter probe (Figure 13, Item 10) to diode CR1 (Figure 13, Item 11). Observe and record resistance value.
15. Repeat Steps 13 through 14 for remaining diodes of F1+ rectifier plate (Figure 13, Item 2).

TEST 400 HZ AC GENERATOR – CONTINUED

16. Touch negative meter probe (Figure 13, Item 10) to F2- terminal (Figure 13, Item 8) and positive meter probe (Figure 13, Item 12) to diode CR4 (Figure 13, Item 7). Observe and record resistance value.
17. Touch positive meter probe (Figure 13, Item 12) to F2- terminal (Figure 13, Item 8) and negative meter probe (Figure 13, Item 10) to diode CR4 (Figure 13, Item 7). Observe and record resistance value.
18. Repeat Steps 16 through 17 for remaining diodes of F2- rectifier plate (Figure 13, Item 5).

NOTE

Resistance value obtained in Step 13 and Step 17 should be $2.74 \text{ M}\Omega \pm 10\%$; and the resistance value obtained in Step 14 and Step 16 should be greater than $27 \text{ M}\Omega$.

Resistance value obtained in Step 14 and Step 16 will typically be infinite resistance.

19. Compare the resistance values obtained in Steps 13 through 18 to specifications to determine if rectifier plates (Figure 13, Items 2 and 5) are serviceable.

NOTE

Rectifier plates (Figure 13, Items 2 and 5) may remain attached to exciter rotor (Figure 14, Item 2) unless further tests reveal the need to remove rectifier plates (Figure 13, Items 2 and 5).

20. Proceed to Test Surge Suppressor task if rectifier is serviceable.
21. Proceed to Replace Rectifier task if rectifier is not serviceable.

END OF TASK**Test Surge Suppressor****NOTE**

Resistance value of surge suppressor (Figure 14, Item 6) should be equal when measured front-to-back and back-to-front. An acceptable value is greater than $1 \text{ M}\Omega$ and measured value will typically be infinite resistance.

1. Select ohms resistance function on multimeter (Figure 11, Item 4).
2. Touch positive meter probe (Figure 11, Item 3) to either connection point (Figure 14, Item 7) of surge suppressor (Figure 14, Item 6).
3. Touch negative meter probe (Figure 11, Item 5) to opposite connection point (Figure 14, Item 7) of surge suppressor (Figure 14, Item 6). Observe and note the resistance value.
4. Reverse points of contact with meter probes (Figure 11, Items 3 and 5). Observe and note resistance value.
5. Compare resistance values obtained in Step 3 and Step 4 to specifications to determine if surge suppressor (Figure 14, Item 6) is serviceable.
6. Set surge suppressor (Figure 14, Item 6) aside for installation if serviceable or replace as required.

END OF TASK**Replace Rectifier**

1. Remove two screws (Figure 14, Item 12), two lockwashers (Figure 14, Item 11), two flat washers (Figure 14, Item 13), and F1+ rectifier plate (Figure 13, Item 2) from exciter rotor (Figure 13, Item 3).
2. Discard lockwashers (Figure 14, Item 11).
3. Repeat Steps 1 through 2 for F2- rectifier plate (Figure 13, Item 5).
4. Inspect mounting surface of exciter rotor (Figure 13, Item 3) where rectifier plates (Figure 13, Items 2 and 5) were attached and clean as required.

TEST 400 HZ AC GENERATOR – CONTINUED

5. Perform Test Rectifier task, Steps 12 through 19 on replacement rectifier plates (Figure 13, Items 2 and 5).
6. Align holes in F1+ rectifier plate (Figure 13, Item 2) with holes in exciter rotor (Figure 13, Item 3) using orientation noted in Test Rectifier task, Step 1.
7. Position two screws (Figure 14, Item 12), two new lockwashers (Figure 14, Item 11), and two flat washers (Figure 14, Item 13) to attach F1+ rectifier plate (Figure 14, Item 1) to exciter rotor (Figure 14, Item 2).
8. Repeat Steps 8 through 9 for F2- rectifier plate (Figure 13, Item 5).

END OF TASK**Test Exciter Rotor Winding****NOTE**

Exciter rotor wires (Figure 13, Item 4) are paired according to a specific order. The order of pairs is Cr1 to Cr4, Cr2 to Cr5, and Cr3 to Cr6.

1. Identify each of six numbered exciter rotor wire (Figure 13, Item 4) terminals.
2. Select ohms resistance function on multimeter (Figure 11, Item 4).
3. Touch either meter probe (Figure 11, Item 3 or 5) to exciter rotor wire (Figure 13, Item 4) terminal identified as CR1.
4. Touch second meter probe (Figure 11, Item 3 or 5) to exciter rotor wire (Figure 13, Item 4) terminal identified as Cr4.
5. Observe and record value of resistance.
6. Repeat Steps 3 through 5 for remaining ordered pairs of exciter rotor wires (Figure 13, Item 4).
7. Touch either meter probe (Figure 11, Item 3 or 5) to exciter rotor wire (Figure 13, Item 4) terminal tagged or marked as CR1.
8. Touch second meter probe (Figure 11, Item 3 or 5) to bare metal area (ground) of exciter rotor (Figure 13, Item 3).
9. Observe and record value of resistance.
10. Repeat Steps 7 through 9 for remaining exciter rotor wire (Figure 13, Item 4) terminals tagged or marked as Cr 2 and Cr3.

NOTE

Resistance values obtained in Steps 3 through 6 should be $0.5 \Omega \pm 10\%$. Accuracy of a multimeter is unreliable when measuring values lower than 1Ω . A measurement value greater than 1Ω or with a $\pm 10\%$ variance for any pair of wires indicates a defective exciter rotor (Figure 13, Item 3).

Resistance values obtained in Steps 7 through 10 of each wire to ground should be at least $1 M\Omega$.

11. Compare the resistance values obtained in Steps 3 through 6 and Steps 7 through 10 to specifications to determine if exciter rotor (Figure 13, Item 3) is serviceable.
12. Proceed to Test Generator Rotor Winding task if exciter rotor (Figure 13, Item 3) is serviceable.

END OF TASK**Test Generator Rotor Winding**

1. Identify generator rotor wires tagged or marked F1+ generator rotor wire (Figure 13, Item 1) and F2-generator rotor wire (Figure 13, Item 6).

TEST 400 HZ AC GENERATOR – CONTINUED

2. Select ohms resistance function on multimeter (Figure 11, Item 4).
3. Touch either meter probe (Figure 11, Item 3 or 5) to F1+ generator rotor wire (Figure 13, Item 1) terminal.
4. Touch second meter probe (Figure 11, Item 3 or 5) to F2- generator rotor wire (Figure 13, Item 6) terminal.
5. Observe and record value of resistance.
6. Touch either meter probe (Figure 11, Item 3 or 5) to F1+ generator rotor wire (Figure 13, Item 1) terminal.
7. Touch second meter probe (Figure 11, Item 3 or 5) to bare metal area (ground) of generator rotor (Figure 11, Item 5).
8. Observe and record value of resistance.

NOTE

Resistance value obtained in Steps 3 through 5 should be $2.10 \Omega \pm 10\%$. Resistance value of infinity indicates an open generator rotor (Figure 11, Item 5) winding and resistance value of zero indicates a shorted generator rotor (Figure 11, Item 5) winding.

Resistance value obtained in Steps 6 through 8 of generator rotor (Figure 11, Item 5) winding to ground should be at least 1 M Ω .

9. Compare the resistance values obtained in Steps 3 through 5 and Steps 6 through 8 to specifications to determine if generator rotor (Figure 11, Item 5) is serviceable.
10. Proceed to Test Generator Stator Winding task if generator rotor winding (Figure 11, Items 5) is serviceable.

END OF TASK**Test Generator Stator Winding**

1. Identify each of the 12 numbered generator output wires (Figure 10, Item 11) removed from voltage selection switch in WP 0054, Remove/Install Voltage Selection Switch using imprinted wire markers.

NOTE

Generator stator winding output wires (Figure 10, Item 11) are paired according to a specific order. The order of pairs is: T1 - T4, T2 - T5, T3 - T6, T7 - T10, T8 - T11, and T9 - T12.

2. Arrange wires into ordered pairs.
3. Select ohms resistance function on multimeter (Figure 11, Item 4).
4. Touch either meter probe (Figure 11, Item 3 or 5) to generator output wire terminal marked T1.
5. Touch second meter probe (Figure 11, Item 3 or 5) to generator output wire terminal marked T4.
6. Observe and record value of resistance.
7. Repeat Steps 4 through 6 for the remaining ordered pairs of wires.
8. Touch either meter probe (Figure 11, Item 3 or 5) to generator output wire marked T1.
9. Touch second meter probe (Figure 11, Item 3 or 5) to bare metal area (ground) of generator stator (Figure 10, Item 6).
10. Observe and record value of resistance.
11. Repeat Steps 8 through 10 for generator output wire terminals marked T2, T3, T7, T8 and T9.

NOTE

Resistance values obtained in Steps 4 through 7 should be $0.209 \Omega \pm 10\%$. Accuracy of a multimeter is unreliable when measuring values lower than 1 Ω . Measurement value greater than 1 Ω or with a $\pm 10\%$ variance for any pair of wires indicates a defective generator stator (Figure 10, Item 6).

TEST 400 HZ AC GENERATOR – CONTINUED

Resistance values obtained in Steps 8 through 11 of each wire to ground should be at least 1 M Ω .

12. Compare resistance values obtained in Steps 4 through 7, and Steps 8 through 11 to specifications to determine if generator stator (Figure 10, Item 6) is serviceable.

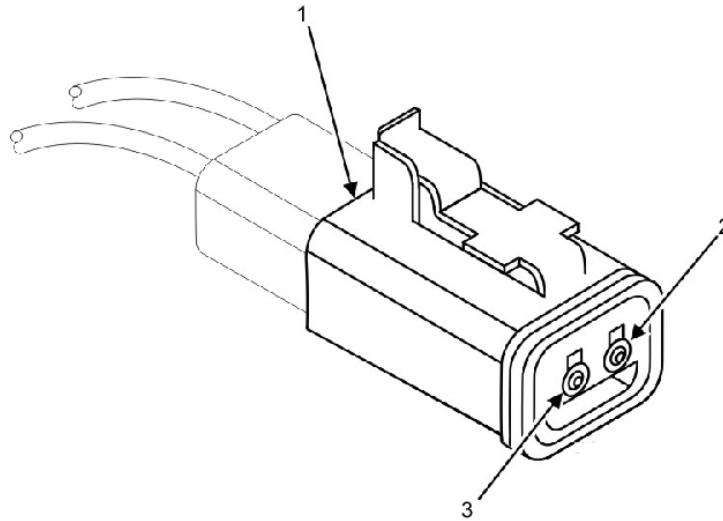


Figure 15. Test 400 Hz Generator Stator Q1/Q2 Winding - Detail.

13. Locate and disconnect Q1/Q2 wiring plug (Figure 15, Item 1) at wire port in generator stator (Figure 10, Item 6).
14. Select ohms resistance function on multimeter (Figure 11, Item 4).
15. Touch either meter probe (Figure 11, Item 3 or 5) to either wiring plug (Figure 15, Item 1) connector (Figure 15, Item 2 or 3).
16. Touch second meter probe (Figure 11, Item 3 or 5) to second wiring plug (Figure 15, Item 1) connector (Figure 15, Item 2 or 3).
17. Observe and record value of resistance.
18. Touch either meter probe (Figure 11, Item 3 or 5) to either wiring plug (Figure 15, Item 1) connector (Figure 15, Item 2 or 3).
19. Touch second meter probe (Figure 11, Item 3 or 5) to bare metal area (ground) of generator stator (Figure 10, Item 6).
20. Observe and record value of resistance.

NOTE

Resistance value obtained in Steps 15 through 17 should be 0.97 Ω $\pm$ 10%.

Resistance value obtained in Steps 18 through 20 to ground should be at least 1 M Ω .

21. Compare resistance values obtained in Steps 15 through 17 and Steps 18 through 20 to specifications to determine if generator stator (Figure 10, Item 6) is serviceable.

END OF TASK

TEST 400 HZ AC GENERATOR – CONTINUED**Inspect Bearing**

1. Examine bearing (Figure 16, Item 1) for discoloration and corrosion that are signs of heat and contamination damage.
2. Touch outer race of bearing (Figure 16, Item 1) lightly with fingertips and rotate slowly in a back-and-forth motion to feel and listen for any signs of roughness and/or lack of lubrication.
3. Proceed to Replace Bearing task if any signs of damage appear or if bearing (Figure 16, Item 1) does not rotate freely.

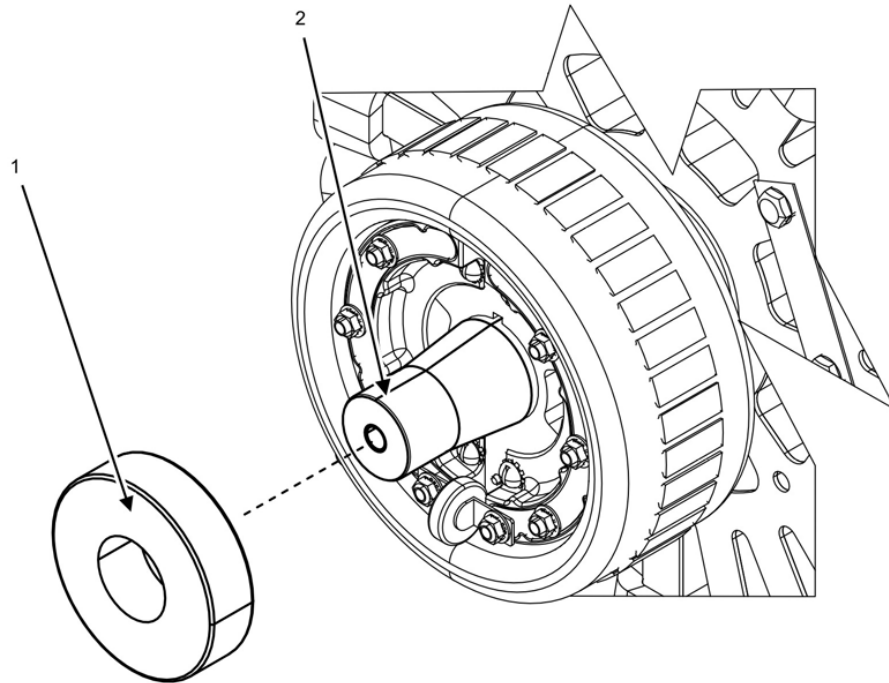


Figure 16. 400 Hz Generator Bearing Removal - Detail.

END OF TASK**Replace Bearing**

1. Attach gear puller to bearing (Figure 16, Item 1).

CAUTION

When a bearing is removed for any reason, always install a new bearing (Figure 16, Item 1). Failure to comply may cause damage to equipment.

2. Remove bearing (Figure 16, Item 1) from generator rotor shaft (Figure 16, Item 2).
3. Clean bearing surface of generator rotor shaft (Figure 16, Item 2).
4. Press new bearing (Figure 16, Item 1) onto generator rotor shaft (Figure 16, Item 2).

END OF TASK**Install End Bell**

1. Perform Test Surge Suppressor task on new surge suppressor (Figure 14, Item 6).

TEST 400 HZ AC GENERATOR – CONTINUED

2. Place surge suppressor (Figure 14, Item 6) onto F1+ terminal (Figure 13, Item 9) and F2- terminal (Figure 13, Item 8).
3. Place F1+ generator rotor wire (Figure 13, Item 1) onto F1+ terminal (Figure 13, Item 9).
4. Install flat washer (Figure 14, Item 9) and new nut with captive lockwasher (Figure 14, Item 10) onto F1+ terminal (Figure 13, Item 9).
5. Place F2- generator rotor wire (Figure 13, Item 6) onto F2- terminal (Figure 13, Item 8).
6. Install flat washer (Figure 14, Item 9) and new nut with captive lockwasher (Figure 14, Item 10) onto F2- terminal (Figure 13, Item 8).
7. Place exciter rotor wire (Figure 13, Item 4) tagged or marked CR1 onto diode tagged or marked CR1 (Figure 13, Item 11).
8. Install flat washer (Figure 14, Item 9) and new nut with captive lockwasher (Figure 14, Item 10) onto diode tagged or marked CR1 (Figure 13, Item 11).
9. Repeat Steps 7 through 8 for remaining exciter rotor wires and diodes (Figure 14, Item 4).
10. Remove tags or marks that will interfere with generator operation.
11. Install new O-ring packing (Figure 10, Item 2) into end bell (Figure 10, Item 4).
12. Insert P90 wiring plug (Figure 10, Item 8) through wire port of generator stator (Figure 10, Item 9).

CAUTION

Use extreme caution when installing end bell (Figure 10, Item 4) onto generator stator (Figure 10, Item 6). End bell (Figure 10, Item 4) is awkward to handle and must be installed without any exciter stator (Figure 10, Item 10) contact with generator rotor (Figure 10, Item 5). Failure to comply will cause damage to equipment.

13. Align tag or mark on end bell (Figure 10, Item 4) with corresponding tag or mark on generator stator (Figure 10, Item 6).
14. Push end bell (Figure 10, Item 4) mating surface evenly into matching machined surface of generator stator (Figure 10, Item 6).

NOTE

End bell (Figure 10, Item 4) may resist installation onto bearing (Figure 10, Item 7). Use a tool that will not damage end bell (Figure 10, Item 4) to tap various points around outside of bearing mating surface until end bell (Figure 10, Item 4) machined surface makes contact with generator stator (Figure 10, Item 6) machined surface.

15. Examine area between end bell (Figure 10, Item 4) machined surface and generator stator (Figure 10, Item 6) machined surface to ensure distance is even.
16. Insert four bolts (Figure 10, Item 14) and four washers (Figure 10, Item 13) into each mounting hole until threads are engaged with generator stator (Figure 10, Item 6).
17. Tighten each bolt (Figure 10, Item 14) gradually in crisscross sequence using the same number of turns each time for each bolt (Figure 10, Item 14) to draw end bell (Figure 10, Item 4) into the generator stator (Figure 10, Item 6).
18. Verify end bell (Figure 10, Item 4) machined surface has fully engaged generator stator (Figure 10, Item 6).
19. Use Remove End Bell task, Steps 11 through 15 if end bell (Figure 10, Item 4) machined surface does not fully engage the generator stator (Figure 10, Item 6) machined surface. Repeat Steps 13 through 18 as required.
20. Loosen four bolts (Figure 10, Item 14) that attach end bell (Figure 10, Item 4) to generator stator (Figure 10, Item 6) 1/2 - 3/4 turn.

TEST 400 HZ AC GENERATOR – CONTINUED

21. Remove lower two bolts (Figure 10, Item 14) and two washers (Figure 10, Item 13) that attach end bell (Figure 10, Item 4) to generator stator (Figure 10, Item 6).
22. Install ground strap (Figure 10, Item 3) according to location noted in Remove End Bell task, Step 9.
23. Install generator output wires (Figure 10, Item 11) and clamp (Figure 10, Item 12) according to location noted in Remove End Bell task, Step 10.
24. Reinstall lower two bolts (Figure 10, Item 14) and two washers (Figure 10, Item 13) that attach end bell (Figure 10, Item 4) to generator stator (Figure 10, Item 6).
25. Torque two bolts (Figure 10, Item 14) to 28-32 ft•lb (38-43 N•m).
26. Pull excess P90 wiring plug (Figure 10, Item 8) wire from generator stator (Figure 10, Item 9) at wire port to length tagged or marked in Remove End Bell task, Step 12.
27. Align holes in end bell cover (Figure 10, Item 1) with matching holes in end bell (Figure 10, Item 4).
28. Install upper two screws (Figure 10, Item 16) and two new lockwashers (Figure 10, Item 17) to loosely attach end bell cover (Figure 10, Item 1) to end bell (Figure 10, Item 4).
29. Install screw (Figure 10, Item 16), new lockwasher (Figure 10, Item 17), and two shielded wire terminals (Figure 10, Item 15) according to location noted in Remove End Bell task Step 4 into lower end bell cover (Figure 10, Item 1) hole.
30. Tighten three screws (Figure 10, Item 16) evenly.
31. Remove tags or marks that will interfere with generator operation.
32. Connect P90 wiring plug (Figure 10, Item 8) to connector (not shown) at generator output wire clamp (Figure 10, Item 12).
33. Install voltage selection switch (WP 0054, Remove/Install Voltage Selection Switch).
34. Install relay panel (WP 0061, Remove/Install Relay Panel).
35. Install fuel tank (WP 0046, Remove/Install Fuel Tank).
36. Install interior body panels (WP 0035, Remove/Install Interior Body Panels).
37. Install left-side body panel (WP 0031, Remove/Install Left-side Body Panel).
38. Install right-side body panel (WP 0032, Remove/Install Right-Side Body Panel).
39. Install rear body panel (WP 0030, Remove/Install Rear Body Panel).
40. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
41. Close generator set doors.
42. Set engine control switch to PRIME & RUN.
43. Start engine and check for proper operation. Bring coolant to normal operating temperature and then apply a 100% rated load for 30 minutes (TM 9-6115-749-10).
44. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
REMOVE/INSTALL CONTACTOR

INITIAL SETUP:**Test Equipment**

Load Bank (WP 0162, Table 2, Item 2)

Personnel Required

91D (1)
Assistant (1)

Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Wrench, Torque, Dial, 3/8 in Drive, 300 in•lb (WP 0162, Table 2, Item 43)

References

WP 0053, Remove/Install Output Terminal Board

Materials/Parts

Contactor, electrical (1) (WP 0113, Item 1)

Grease, electrically conductive (WP 0163, Table 1, Item 20)

Tag, marker (WP 0163, Table 1, Item 35)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)

Engine cool

Battery ground cable removed (WP 0036, Remove/Install Batteries)

REMOVE/INSTALL CONTACTOR**Remove Contactor**

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate contactor (Figure 1).

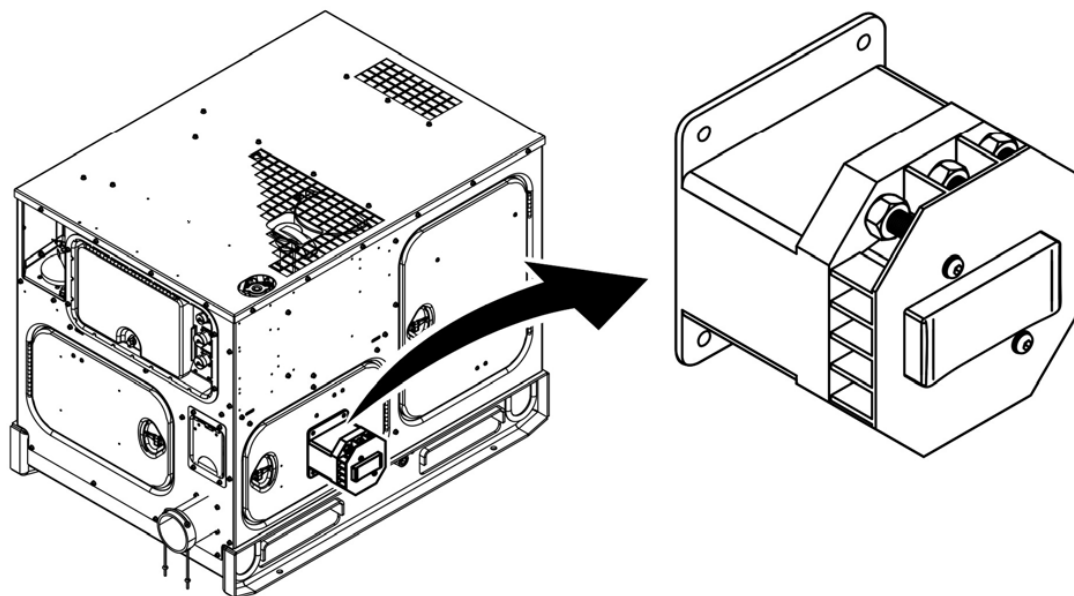


Figure 1. Contactor - Location.

REMOVE/INSTALL CONTACTOR – CONTINUED

3. Remove cable entry guard and output terminal board (WP 0053, Remove/Install Output Terminal Board).
4. Remove two screws and two captive flat washers (Figure 2, Item 2) securing contactor cover (Figure 2, Item 1).
5. Remove contactor cover (Figure 2, Item 1).

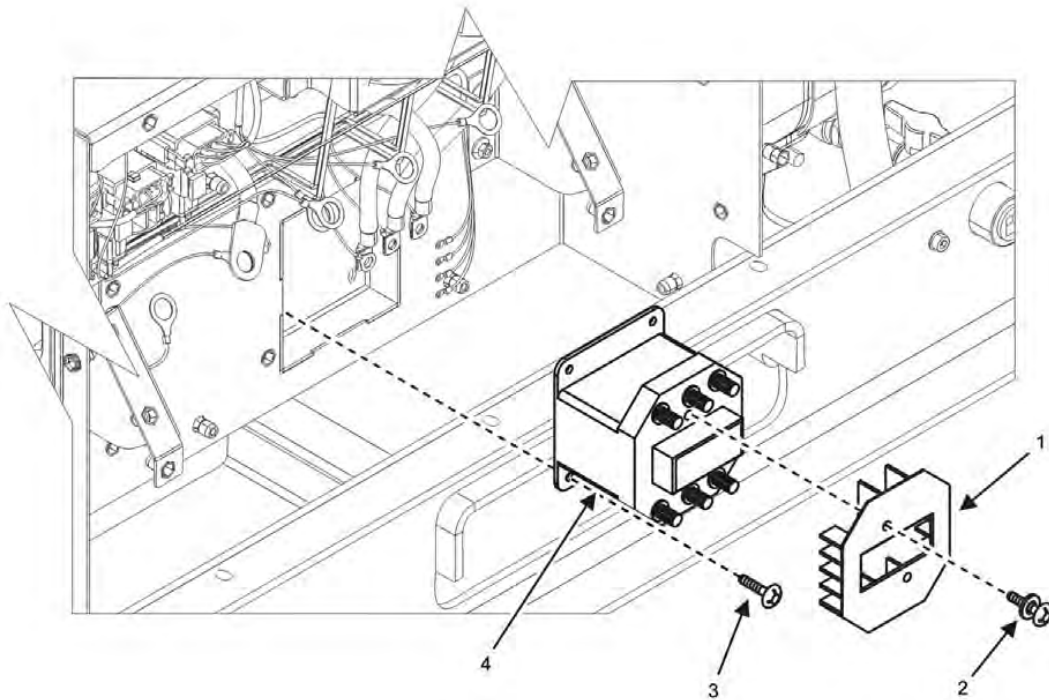
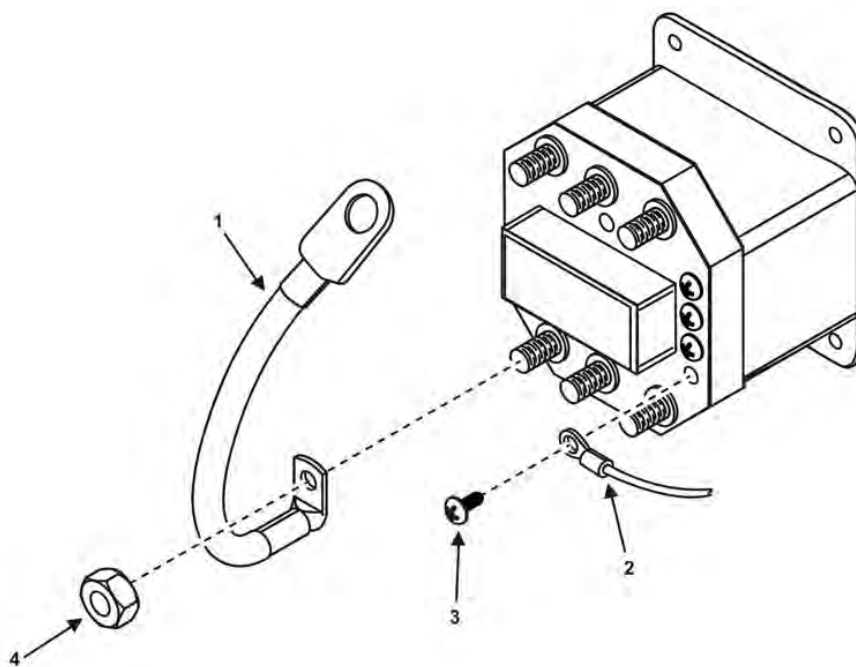


Figure 2. Contactor - Details.

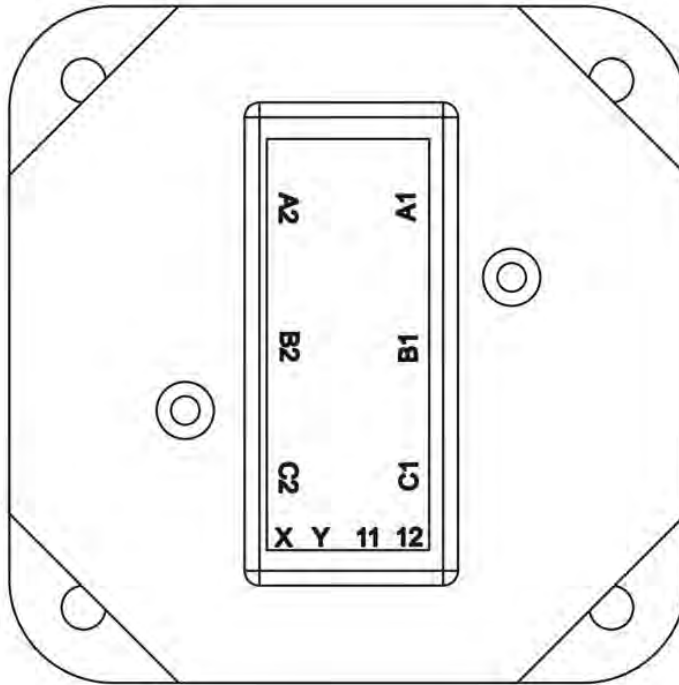
REMOVE/INSTALL CONTACTOR – CONTINUED

**Figure 3. Contactor Wire - Removal.****NOTE**

Prior to disassembly, tag all electrical wires, cables, and leads for identification. Tags will be used as a guide during reassembly.

Contactor is labeled (Figure 4). Label each wire according to the location label on the contactor to aid in installation.

6. Tag electrical leads (Figure 3, Item 1) on contactor (Figure 2, Item 4) according to location labels on contactor (Figure 4).
7. Remove six hex nuts (Figure 3, Item 4) securing electrical leads (Figure 3, Item 1) to contactor (Figure 2, Item 4).
8. Remove six electrical leads (Figure 3, Item 1) from contactor (Figure 2, Item 4).
9. Tag four wiring harness electrical leads (Figure 3, Item 2) on contactor (Figure 2, Item 4).
10. Remove four screws (Figure 3, Item 3) securing wiring harness electrical leads (Figure 3, Item 2) to contactor (Figure 2, Item 4).
11. Inspect electrical leads (Figure 3, Item 1) and wiring harness electrical leads (Figure 3, Item 2) for damage and replace as required.

REMOVE/INSTALL CONTACTOR – CONTINUED**Figure 4. Contactor Wire Labels.**

12. Remove four screws (Figure 2, Item 3) securing contactor (Figure 2, Item 6) to output box.
13. Remove contactor (Figure 2, Item 4) from output box and place on a suitable work surface.

END OF TASK**Inspect Contactor**

1. Inspect contactor cover (Figure 2, Item 1) for cracks and damage and replace contactor (Figure 2, Item 4) as required.
2. Inspect two contactor cover screws and captive flat washers (Figure 2, Item 2) for worn threads and damaged captive flat washer and other signs of obvious damage and replace contactor (Figure 2, Item 4) as required.
3. Inspect contactor (Figure 2, Item 4) for signs of obvious damage and replace as required.
4. Inspect all mounting hardware and replace as required.

END OF TASK

REMOVE/INSTALL CONTACTOR – CONTINUED

Test Contactor

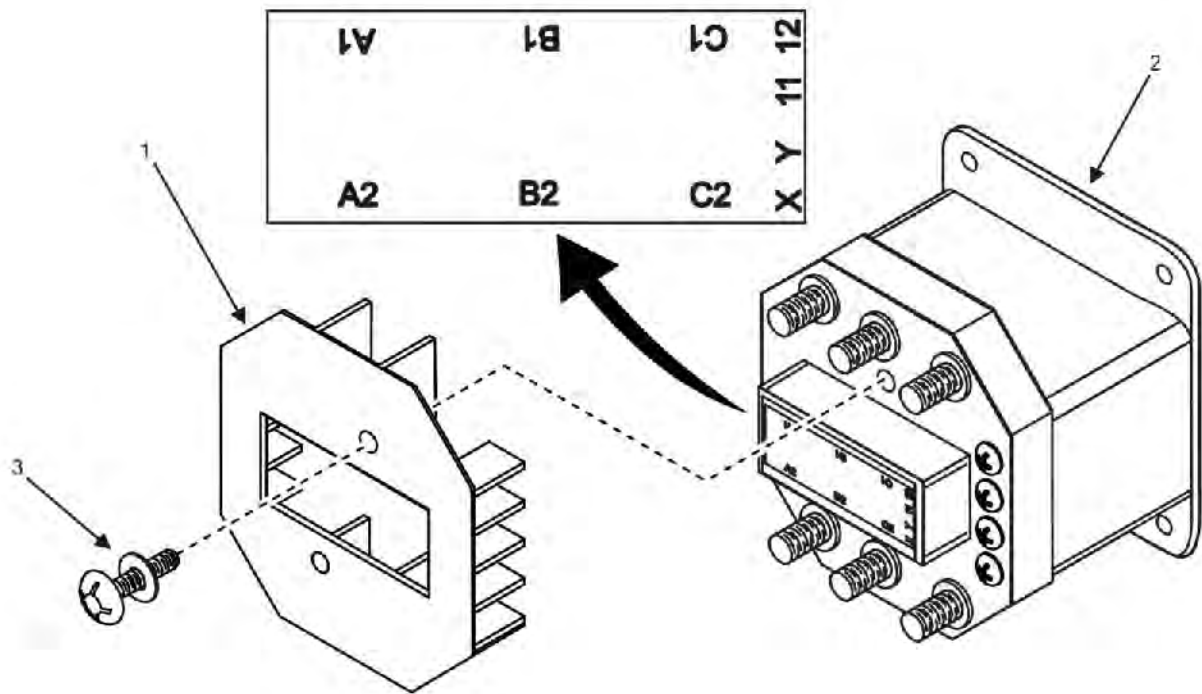


Figure 5. Contactor - Terminals.

1. Remove contactor (Figure 5, Item 2). See Remove Contactor task.
2. Remove two screws and captive washers (Figure 5, Item 3) securing contactor cover (Figure 5, Item 1) to contactor (Figure 5, Item 2) if not already removed.
3. Remove contactor cover (Figure 5, Item 1) if not already removed.

NOTE

Terminals A1 through C1 (Figure 5) are for the wiring from the voltage selection switch and A2 through C2 (Figure 5) are for the output box terminal wires. Terminals X and Y (Figure 5) are for the wires that energize the contactor coil. Terminals 11 and 12 (Figure 5) are for wires for the auxiliary contact.

4. Measure the resistance between each terminal of the input side of contactor (Figure 5, Item 2) (Terminals A1 through C1) and output side of contactor (Figure 5, Item 2) (Terminals A2 through C2). Ensure resistance between any two terminals is infinite or high (approximately 100 k Ω or more).
5. Replace contactor (Figure 5, Item 2) if a low (10 Ω or less) or zero Ω value is obtained. See Install Contactor task.

NOTE

Resistance reading between terminals X and Y should be 47 $\Omega \pm 10\%$.

6. Using a multimeter set to test resistance, measure the resistance between terminals X and Y (Figure 5).
7. Replace contactor (Figure 5, Item 2) if reading is outside of specification. See Install Contactor task.
8. Using a multimeter set to test continuity, measure for continuity between terminals 11 and 12 (Figure 5) and between each terminal and ground.

REMOVE/INSTALL CONTACTOR – CONTINUED

9. Replace contactor (Figure 5, Item 5) if continuity is found. See Install Contactor task.

NOTE

Any continuity measurement between wires A1, B1, and C1 with wires installed to contactor terminals A1 through C1 will result in continuity through the voltage selection switch. Ensure wires are removed when checking for continuity between terminals A1, B1, and C1 to obtain proper measurement.

10. Using a multimeter set to test resistance, measure resistance between each contactor terminal (11, 12, A1, A2, B1, B2, C1, and C2) (Figure 5). Ensure resistance between any two terminals is infinite or high.
11. Replace contactor (Figure 5, Item 2) if a low or zero Ω value is obtained. See Install Contactor task.
12. Using a multimeter set to test resistance, measure resistance between terminal X and each terminal (11, 12, A1, A2, B1, B2, C1, and C2) (Figure 5). Ensure resistance between X and any other terminal is infinite or high.
13. Replace contactor (Figure 5, Item 2) if resistance is low or zero Ω . See Install Contactor task.
14. Using a multimeter set to test resistance, measure resistance between terminal Y and each terminal (11, 12, A1, A2, B1, B2, C1, and C2) (Figure 5). Ensure resistance between Y and any other terminal is infinite or high.
15. Replace contactor (Figure 5, Item 2) if resistance is low or zero Ω . See Install Contactor task.

END OF TASK**Install Contactor**

1. Position contactor (Figure 2, Item 4) to mounting location in output box and align the mounting holes.
2. Secure contactor (Figure 2, Item 4) to mounting location in output box by installing four screws (Figure 2, Item 3). Torque screws to 53-62 in•lb (6-7 N•m).

NOTE

Identification tags should remain in place until the output box is completely reassembled and has been tested for proper operation.

Apply a thin coat of electrically conductive grease to all electrical connections prior to assembly.

3. Install six electrical leads (Figure 3, Item 1) to contactor (Figure 2, Item 4) using tags and location labels on contactor (Figure 4).
4. Secure electrical leads (Figure 3, Item 1) with six hex nuts (Figure 3, Item 4). Torque nuts to 69-85 in•lb (8-12 N•m).
5. Position wiring harness electrical leads (Figure 3, Item 2) to contactor (Figure 2, Item 4) using tags from removal.
6. Install wiring harness electrical leads (Figure 3, Item 2) to contactor (Figure 2, Item 4) with four screws (Figure 3, Item 3).
7. Position contactor cover (Figure 2, Item 3) over contactor (Figure 2, Item 6).
8. Secure contactor cover (Figure 2, Item 1) with two screws with captive flat washers (Figure 2, Item 4).
9. Install cable entry guard and output terminal board (WP 0053, Remove/Install Output Terminal Board).
10. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
11. Close generator set doors.

REMOVE/INSTALL CONTACTOR – CONTINUED

12. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
13. Start engine and check for proper operation. Bring coolant to normal operating temperature and then apply a 100% rated load for 30 min (TM 9-6115-749-10).
14. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

REMOVE/INSTALL OUTPUT TERMINAL BOARD

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
 Wrench, Torque, Dial, 3/8 in Drive, 300 in•lb (WP 0162, Table 2, Item 43)
 Wrench, Torque, Click, Ratcheting, 3/8 in Drive, 75 ft•lb (WP 0162, Table 2, Item 41)
 Wrench, Torque, Click, Ratcheting, 1/2 in Drive, 250 ft•lb (WP 0162, Table 2, Item 40)

Materials/Parts

Board, connection (1) (WP 0114, Item 4)
 Nut, lock 3/8 16 UNC28, brass (4) (WP 0114, Item 5)
 Nut, nylon lock 1/2 13 stainless steel (5) (WP 0114, Item 10)
 Terminal stud, load (5) (WP 0114, Item 13)
 Brush, wire, scratch, brass (WP 0163, Table 1, Item 7)
 Grease, electrically conductive (WP 0163, Table 1, Item 20)
 Tag, marker (WP 0163, Table 1, Item 35)

Personnel Required

91D (1)
 Assistant (1)

References

WP 0093, General Maintenance

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool
 Battery ground cable removed (WP 0036, Remove/Install Batteries)
 Right-side body panel removed (WP 0032, Remove/Install Right-side Body Panel)

REMOVE/INSTALL OUTPUT TERMINAL BOARD

Remove Output Terminal Board

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate output terminal board (Figure 1) in output box.

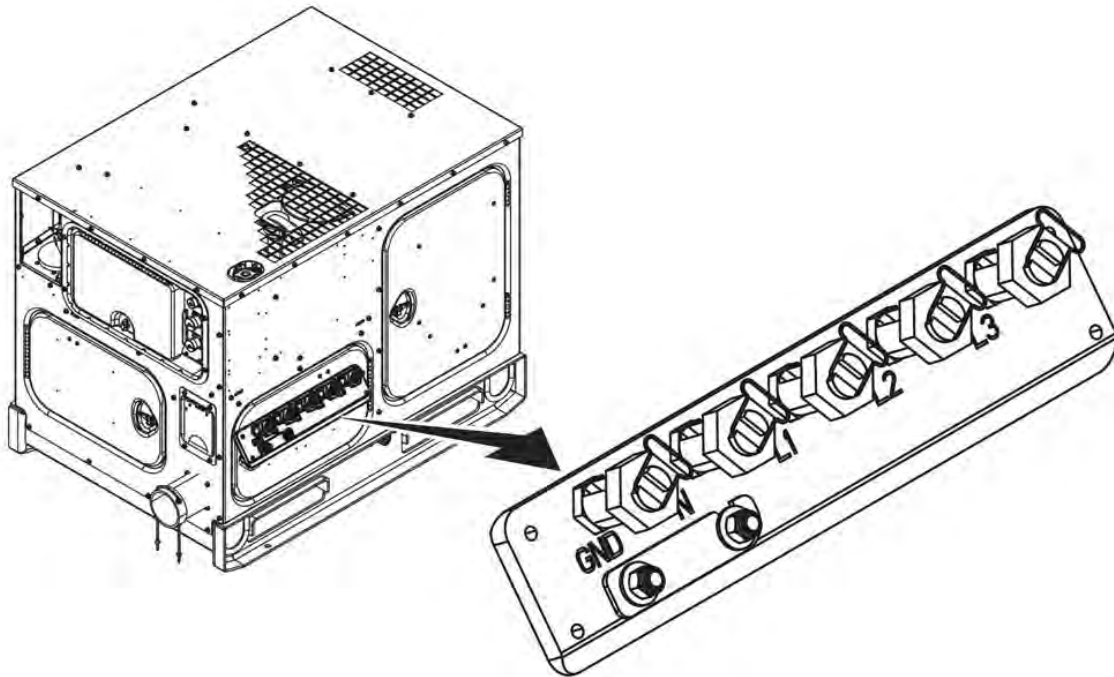
REMOVE/INSTALL OUTPUT TERMINAL BOARD – CONTINUED

Figure 1. Output Terminal Board - Location.

3. Remove four screws (Figure 2, Item 7) securing cable entry guard (Figure 2, Item 6) over output terminal board (Figure 2, Item 1).
4. Inspect cable entry guard (Figure 2, Item 6) and screws (Figure 2, Item 7) for obvious signs of damage and replace as required.
5. Remove four screws (Figure 2, Item 8) securing output terminal board (Figure 2, Item 1) to output box.
6. Position output terminal board (Figure 2, Item 1) to access underside of board.

REMOVE/INSTALL OUTPUT TERMINAL BOARD – CONTINUED

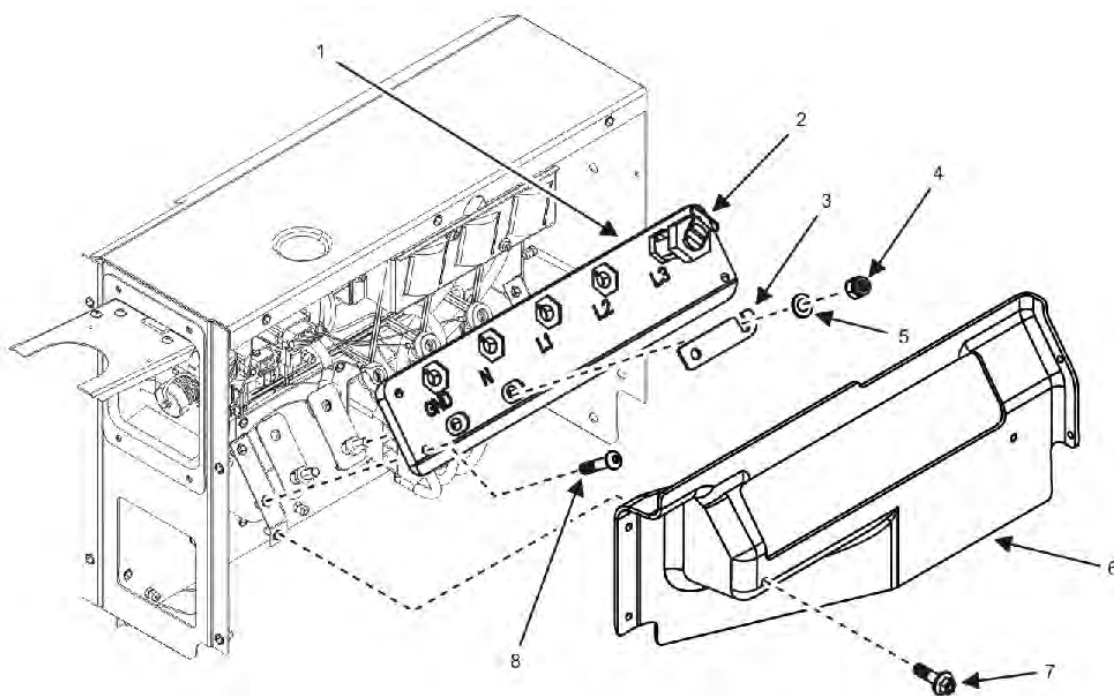


Figure 2. Output Terminal Board - Detail.

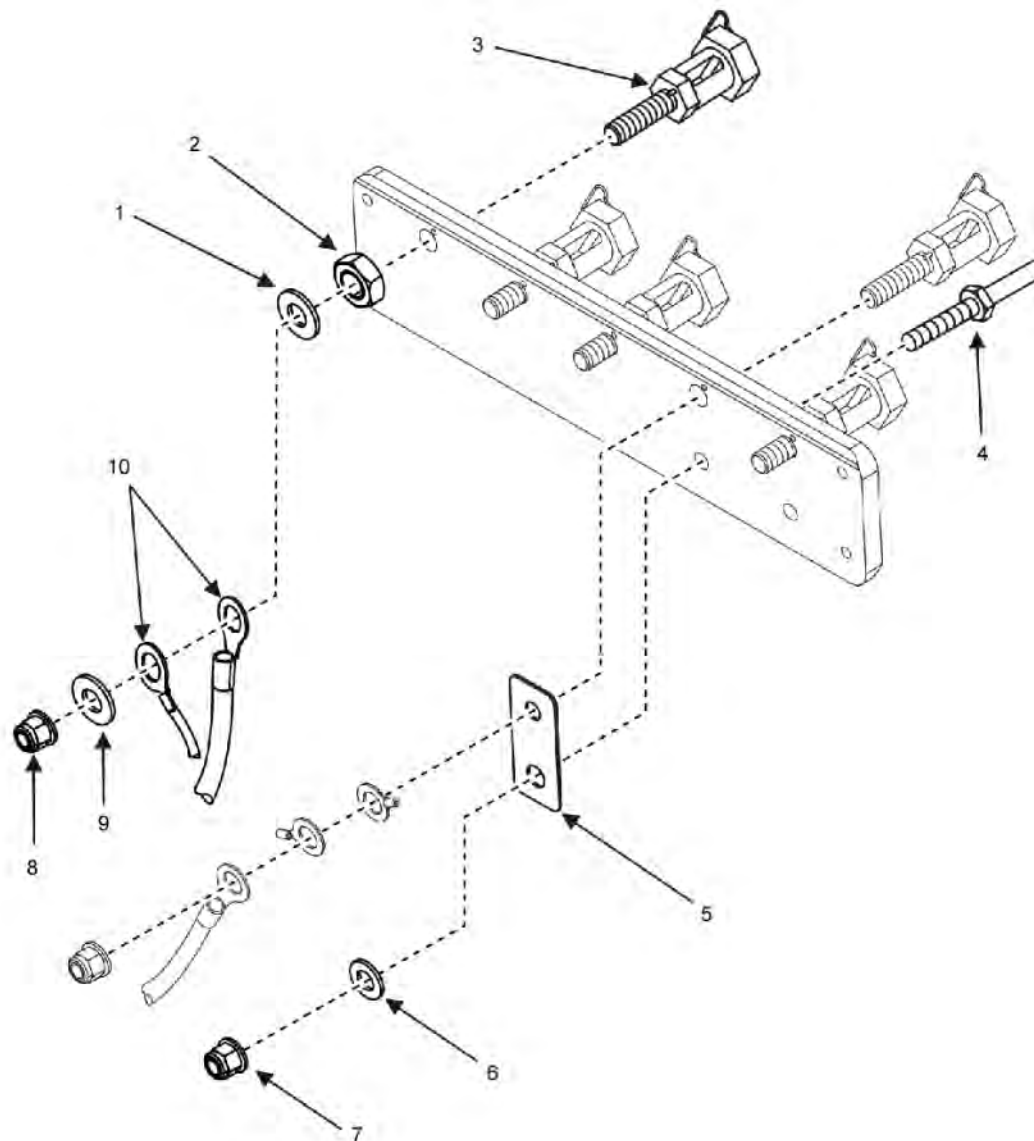
NOTE

Five large terminal studs (Figure 2, Item 2) are secured to the output terminal board (Figure 2, Item 1). Some terminal studs (Figure 2, Item 2) may have multiple wires (Figure 3, Item 10). Neutral (N) terminal stud also secures wire (not shown) from convenience receptacle to rear of output terminal board (Figure 2, Item 1). Ground (GND) terminal stud also secures grounding straps (not shown).

The procedure for removing wires (Figure 3, Item 10) is the same for all five terminal studs (Figure 3, Item 3). GND and N terminal stud positions have ground busbars (Figure 3, Item 5) installed to the rear and a neutral busbar (Figure 2, Item 3) installed to the front of the output terminal board (Figure 2, Item 1). To aid installation, tag all wires and connectors prior to removal.

7. Tag all wires (Figure 3, Item 10) according to their terminal stud (Figure 2, Item 2) locations on output terminal board (Figure 2, Item 1).

REMOVE/INSTALL OUTPUT TERMINAL BOARD – CONTINUED

Legend

- | | | |
|-----------------|-----------------|---------------|
| 1 Flat Washer | 5 Ground Busbar | 9 Flat Washer |
| 2 Nut | 6 Flat Washer | 10 Wires |
| 3 Terminal Stud | 7 Locknut | |
| 4 Busbar Stud | 8 Locknut | |

Figure 3. Output Terminal Board Detail - Reverse Side.**NOTE**

Figure 3 is shown from the rear of the output terminal board to aid in visualization.

8. Remove nylon locknut (Figure 3, Item 8) and flat washer (Figure 3, Item 9) securing wires (Figure 3, Item 10) to output terminal stud (Figure 3, Item 3). Discard nylon locknut (Figure 3, Item 8).
9. Remove wires (Figure 3, Item 10) from terminal stud (Figure 3, Item 3).
10. Repeat Steps 8 and 9 for all remaining wires (Figure 3, Item 10) on output terminal stud (Figure 3, Item 3).

REMOVE/INSTALL OUTPUT TERMINAL BOARD – CONTINUED

11. Remove flat washer (Figure 3, Item 1) and nut (Figure 3, Item 2) securing terminal stud (Figure 3, Item 3) to output terminal board (Figure 2, Item 1).
12. Repeat Step 11 for all remaining terminal studs (Figure 3, Item 3) on output terminal board (Figure 2, Item 1).
13. Remove terminal studs (Figure 3, Item 3) from output terminal board (Figure 2, Item 1).
14. Remove two GND busbar locknuts (Figure 3, Item 7) and two flat washers (Figure 3, Item 6) that secure ground busbars (Figure 3, Item 5) on rear of output terminal board (Figure 2, Item 1).
15. Remove output terminal board (Figure 2, Item 1) from output box and place on a suitable work surface.
16. Remove locknuts (Figure 2, Item 4) and washers (Figure 2, Item 5) that secure neutral busbar (Figure 2, Item 3) to front of output terminal board (Figure 2, Item 1).
17. Remove busbar studs (Figure 3, Item 4) from output terminal board (Figure 2, Item 1).

END OF TASK**Inspect Output Terminal Board**

1. Inspect output terminal board (Figure 2, Item 1) for cracks or other damage. Replace as required.
2. Inspect cable entry guard (Figure 2, Item 6) for cracks or other signs of obvious damage and replace as required.
3. Inspect all nuts (Figure 3, Item 2), washers (Figure 2, Item 5 and Figure 3, Items 1, 6, and 9), and screws (Figure 2, Items 7 and 8) for obvious signs of damage and replace as required.
4. Inspect terminal studs (Figure 2, Item 2) for damage or corrosion.
5. Inspect wires (Figure 3, Item 10) for fraying, cracks, or corrosion. Repair wires or replace as required (WP 0093, General Maintenance).
6. Remove minor corrosion from wires (Figure 3, Item 10) using wire brush.
7. Inspect ground busbars (Figure 3, Item 5) and neutral busbar (Figure 2, Item 3) for damage and replace as required.

END OF TASK**Install Output Terminal Board****NOTE**

GND busbar locknut (Figure 3, Item 7) also secures grounding strap (not shown).

1. Install two busbar studs (Figure 3, Item 4) through output terminal board (Figure 2, Item 1).
2. Install two new GND busbar locknuts (Figure 3, Item 7), two flat washers (Figure 3, Item 6), and two busbar studs (Figure 3, Item 4) that secure ground busbars (Figure 3, Item 5) on rear of output terminal board (Figure 2, Item 1).
3. Install locknuts (Figure 2, Item 4) and washers (Figure 2, Item 5) that secure neutral busbar (Figure 2, Item 3) to front of output terminal board (Figure 2, Item 1).
4. Torque locknuts (Figure 2, Item 4 and Figure 3, Item 7) to 124-159 in•lb (14-18 N•m).

NOTE

Five large terminal studs (Figure 2, Item 2) are secured to the output terminal board (Figure 2, Item 1). Some terminal studs (Figure 2, Item 2) may have multiple wires (Figure 3, Item 10). N terminal stud also secures wire (not shown) from convenience receptacle to rear of output terminal board (Figure 2, Item 1). GND terminal stud also secures grounding straps (not shown).

REMOVE/INSTALL OUTPUT TERMINAL BOARD – CONTINUED

The procedure for removing wires (Figure 3, Item 10) is the same for all five terminal studs (Figure 3, Item 3). GND and N terminal stud positions have ground busbars (Figure 3, Item 5) installed to the rear and a neutral busbar (Figure 2, Item 3) installed to the front of the output terminal board (Figure 2, Item 1). To aid installation, tag all wires and connectors prior to removal.

5. Insert terminal stud (Figure 2, Item 2) through opening in front of output terminal board (Figure 2, Item 1).
6. Install nut (Figure 3, Item 2) to attach output terminal stud (Figure 3, Item 3) to output terminal board (Figure 2, Item 1).
7. Torque each nut (Figure 3, Item 2) to 23-26 ft•lb (30-36 N•m).
8. Install flat washer (Figure 3, Item 1) to back of terminal stud (Figure 3, Item 3).
9. Install appropriately tagged wires (Figure 3, Item 10) over back of terminal stud (Figure 3, Item 3).
10. Install flat washer (Figure 3, Item 9) to back of output terminal stud (Figure 3, Item 3).
11. Install new nylon locknut (Figure 3, Item 8) over wires (Figure 3, Item 10).

NOTE

Two wrenches are required to connect the nylon locknut (Figure 3, Item 8).

12. Torque new nylon locknut (Figure 3, Item 8) to 27-32 ft•lb (36-44 N•m).
13. Repeat Steps 4 through 11 to attach all remaining terminal studs (Figure 3, Item 3) and wires (Figure 3, Item 10) to output terminal board (Figure 2, Item 1).
14. Position output terminal board (Figure 2, Item 1) to mounting location in output box.
15. Secure output terminal board (Figure 2, Item 1) to output box with four screws (Figure 2, Item 8). Torque screws to 89-106 in•lb (10-12 N•m).
16. Position cable entry guard (Figure 2, Item 6) over output terminal board (Figure 2, Item 1).
17. Install four screws (Figure 2, Item 7) securing cable entry guard (Figure 2, Item 6) over output terminal board (Figure 2, Item 1). Torque screws to 27-35 in•lb (3-4 N•m).
18. Install right-side body panel (WP 0032, Remove/Install Right-side Panel).
19. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
20. Close generator set doors.
21. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
22. Start engine and check for proper operation. Bring coolant to normal operating temperature and then apply a 100% rated load for 30 min (TM 9-6115-749-10).
23. Repair as required.
24. Remove identification tags.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCEREMOVE/INSTALL VOLTAGE SELECTION SWITCH

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
Wrench, Torque, Dial, 1/4 in Drive, 30 in•lb (WP 0162, Table 2, Item 42)
Wrench, Torque, Dial, 3/8 in Drive, 300 in•lb (WP 0162, Table 2, Item 43)

Personnel Required

91D (1)

References

WP 0058, Remove/Install Printed Circuit Board Module

Materials/Parts

Switch, rotary (1) (WP 0115, Item 20)
Grease, electrically conductive (WP 0163, Table 1, Item 20)
Pad, scouring (WP 0163, Table 1, Item 27)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)

REMOVE/INSTALL VOLTAGE SELECTION SWITCH**Remove Voltage Selection Switch**

1. Ensure equipment conditions are met in order presented in initial setup.
2. Open output box door.
3. Remove five screws (not shown) that secure cover (not shown) of output box.
4. Remove cover (not shown) from output box.
5. Inspect cover (not shown) for signs of obvious damage and replace as required or set aside for reuse.

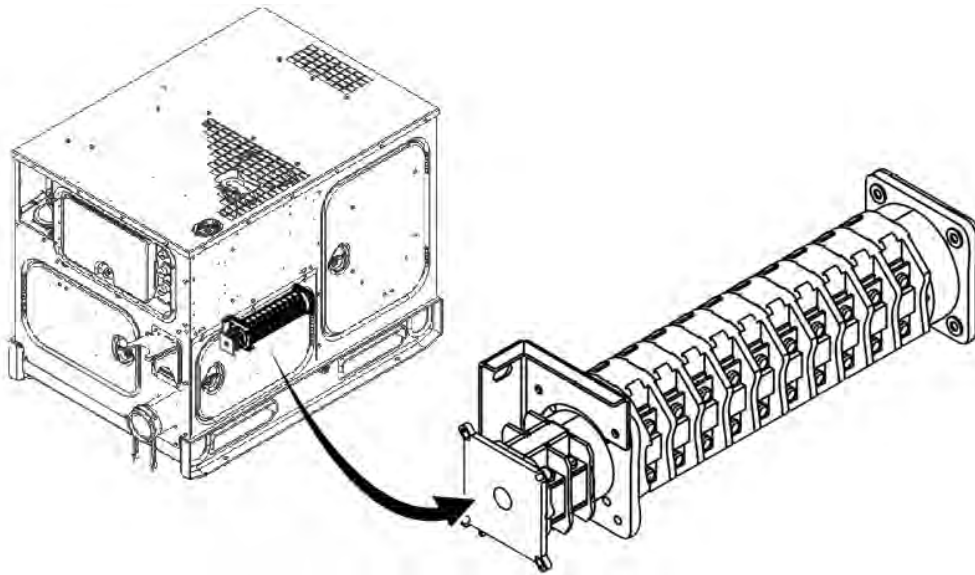
REMOVE/INSTALL VOLTAGE SELECTION SWITCH – CONTINUED

Figure 1. Voltage Selection Switch - Location.

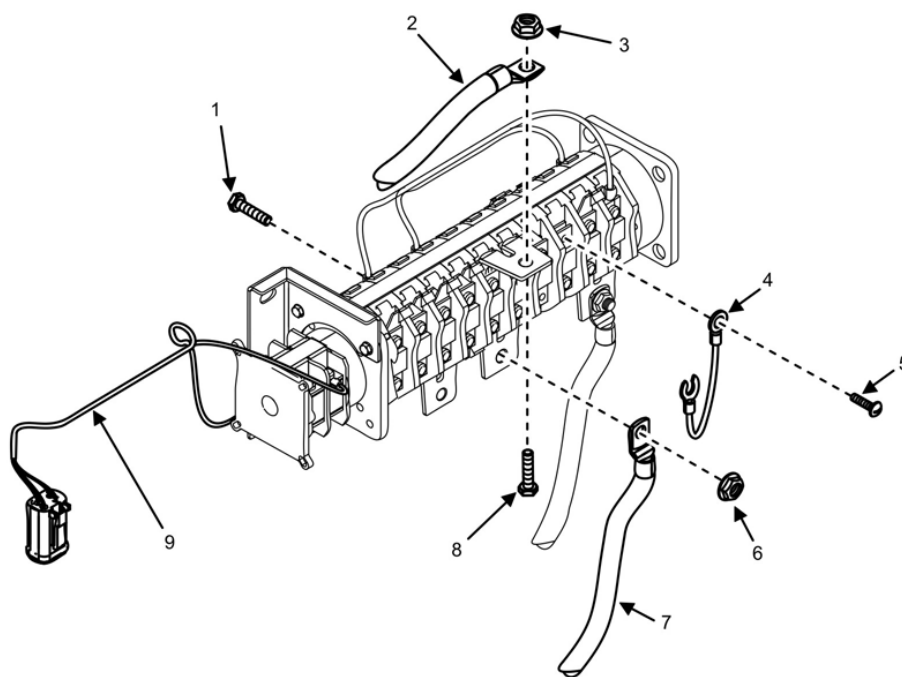
6. Locate voltage selection switch (Figure 1).

NOTE

Prior to disassembly, tag all electrical wires and connectors for identification. Tags will be used as a guide during reassembly.

7. Tag three wires (Figure 2, Item 7) to voltage selection switch (Figure 4, Item 6).
8. Remove three nuts (Figure 2, Item 6) and three screws (Figure 2, Item 1) securing wires (Figure 2, Item 7) to voltage selection switch (Figure 4, Item 6).

REMOVE/INSTALL VOLTAGE SELECTION SWITCH – CONTINUED

**Figure 2. Voltage Selection Switch Wire - Removal.**

9. Remove wires (Figure 2, Item 7) from voltage selection switch (Figure 4, Item 6).
10. Tag wire (Figure 2, Item 2) at top of voltage selection switch (Figure 4, Item 6).
11. Remove screw (Figure 2, Item 8) and nut (Figure 2, Item 3) that secure wire (Figure 2, Item 2) on top plate of voltage selection switch (Figure 4, Item 6).
12. Remove wire (Figure 2, Item 2) from top of voltage selection switch (Figure 4, Item 6).
13. Tag and remove wiring harness (Figure 2, Item 9) from printed circuit board module (WP 0058, Remove/Install Printed Circuit Board Module).
14. Inspect wiring harness (Figure 2, Item 9) for signs of obvious damage, and replace as required.
15. Open right-side door.

NOTE

Replacement voltage selection switch (Figure 4, Item 6) includes a new handle (Figure 3, Item 1) and gasket (not shown). Figure 3 shows output box with components removed for clarity.

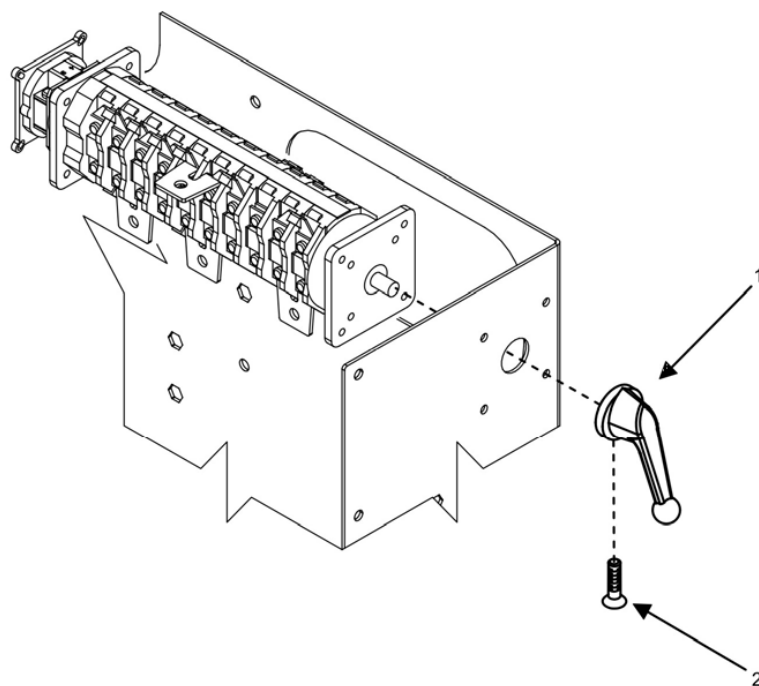
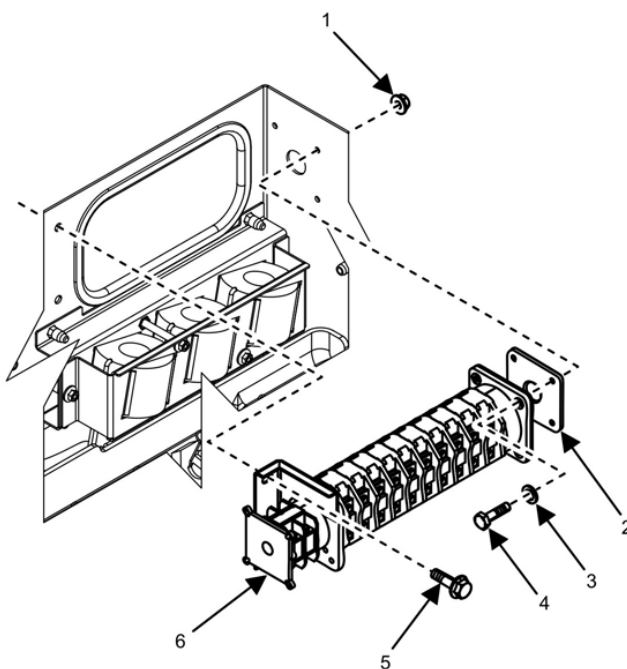
REMOVE/INSTALL VOLTAGE SELECTION SWITCH – CONTINUED

Figure 3. Voltage Selection Switch Handle - Removal.

16. Loosen setscrew (Figure 3, Item 2) in center of handle (Figure 3, Item 1) that secures handle (Figure 3, Item 1) to voltage selection switch (Figure 4, Item 6).

REMOVE/INSTALL VOLTAGE SELECTION SWITCH – CONTINUED

**Figure 4. Voltage Selection Switch - Removal.**

17. Remove four flare nuts (Figure 4, Item 1) that secure voltage selection switch (Figure 4, Item 6) and mounting plate (Figure 4, Item 2) to right-side of output box.
18. Remove two screws (Figure 4, Item 5) that secure mounting bracket (Figure 6, Item 1) to output box.
19. Reposition voltage selection switch (Figure 4, Item 6) to allow access to wires (Figure 2, Item 4).

NOTE

Voltage selection switch is labeled (Figure 5). Tag each wire (Figure 2, Item 4) according to the location label on the voltage selection switch to aid in installation.

20. Tag wires (Figure 2, Item 4) on voltage selection switch (Figure 4, Item 6) according to location label (Figure 5).
21. Remove screws (Figure 2, Item 5) securing wires (Figure 2, Item 4) to voltage selection switch (Figure 4, Item 6).
22. Inspect wires (Figure 2, Item 4) for damage and replace as required.
23. Remove three nuts (Figure 6, Item 3) and three washers (Figure 6, Item 2) that secure voltage selection switch (Figure 4, Item 6) to mounting bracket (Figure 6, Item 1).
24. Remove three screws (Figure 6, Item 5) and three washers (Figure 6, Item 4) that secure voltage selection switch (Figure 4, Item 6) to mounting bracket (Figure 6, Item 1).
25. Remove voltage selection switch (Figure 4, Item 6) from unit.

REMOVE/INSTALL VOLTAGE SELECTION SWITCH – CONTINUED

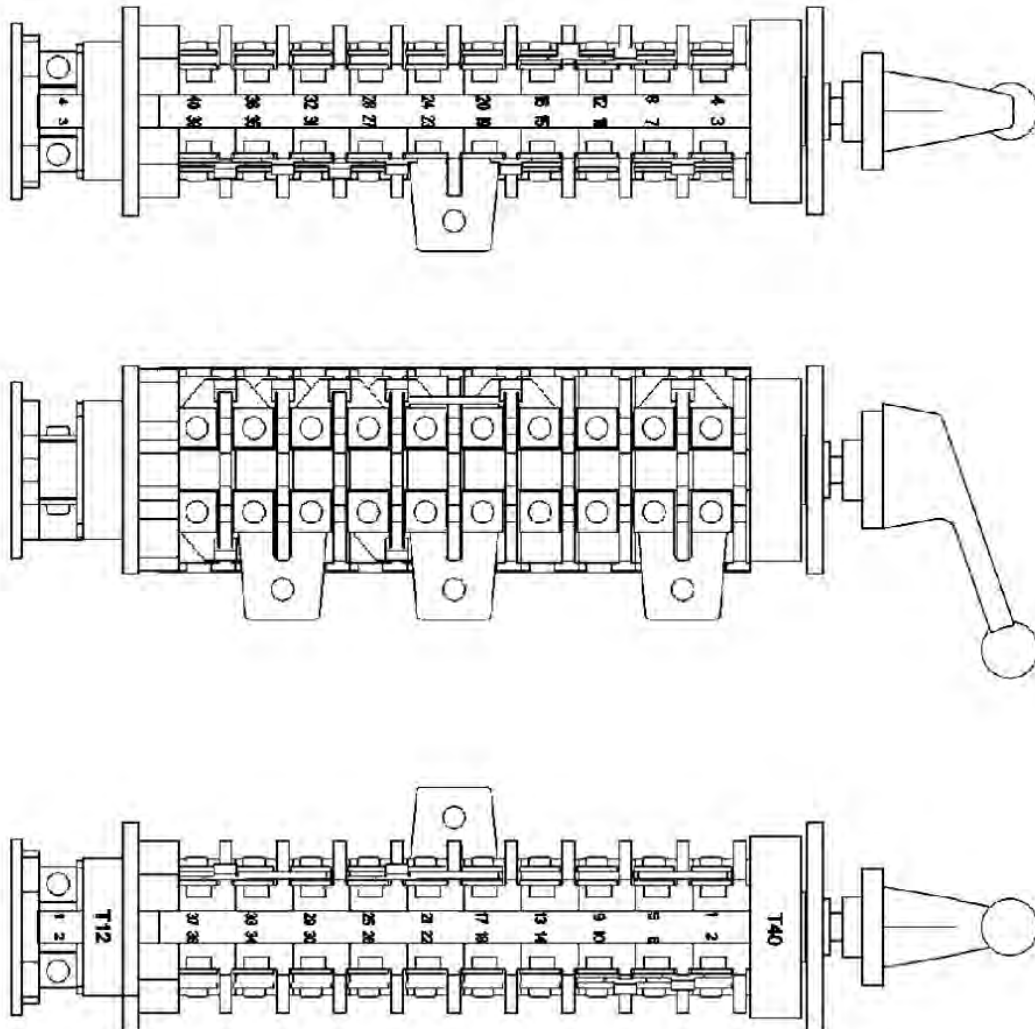
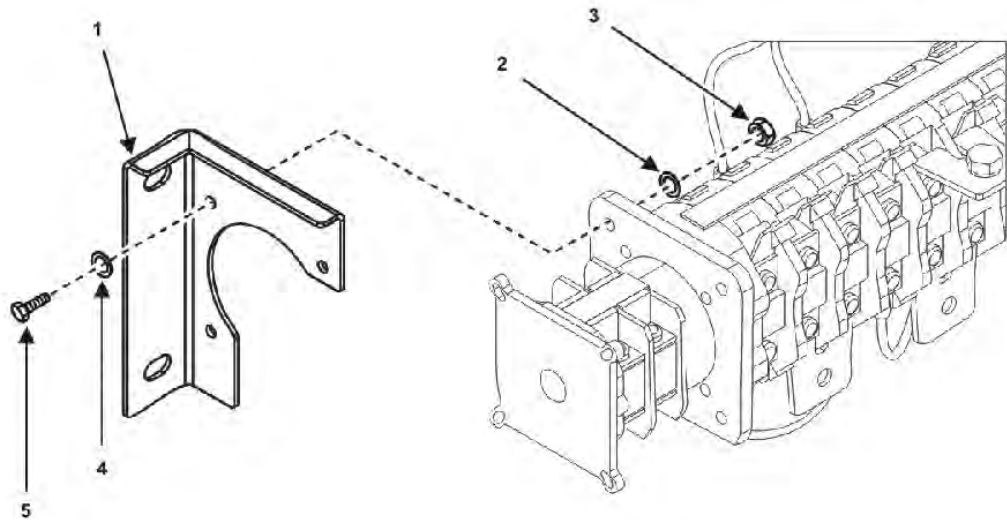


Figure 5. Voltage Selection Switch Wire Labels.

REMOVE/INSTALL VOLTAGE SELECTION SWITCH – CONTINUED**Figure 6. Voltage Selection Switch Mounting Bracket - Removal.**

26. Remove four screws (Figure 4, Item 4) and four flat washers (Figure 4, Item 3) that secure voltage selection switch (Figure 4, Item 6) to mounting plate (Figure 4, Item 3).
27. Place voltage selection switch (Figure 4, Item 6) on a suitable work surface.

END OF TASK**Inspect Voltage Selection Switch**

1. Inspect voltage selection switch (Figure 4, Item 6) for signs of obvious damage and replace as required.
2. Inspect wiring harness (Figure 2, Item 9) for signs of obvious damage and replace as required.
3. Inspect mounting bracket (Figure 6, Item 1) for signs of obvious damage and replace as required.
4. Inspect mounting plate (Figure 4, Item 3) for signs of obvious damage and replace as required.
5. Remove residual gasket material from inside output box in mounting area of voltage selection switch (Figure 4, Item 6) using an abrasive pad.
6. Inspect screws (Figure 2, Items 1, 5, and 8; Figure 4, Items 4 and 5; and Figure 6, Item 5), setscrew (Figure 3, Item 2), nuts (Figure 2, Items 3 and 6 and Figure 6, Item 3), flare nuts (Figure 4, Item 1), and washers (Figure 4, Item 3; Figure 6, Items 2 and 4) for signs of damage and replace as required.

END OF TASK**Install Voltage Selection Switch**

1. Position mounting plate (Figure 4, Item 2) to voltage selection switch (Figure 4, Item 6) and secure with four screws (Figure 4, Item 4) and four flat washers (Figure 4, Item 3).
2. Install three screws (Figure 6, Item 5) and three washers (Figure 6, Item 4) that secure mounting bracket (Figure 6, Item 1) to voltage selection switch (Figure 4, Item 6).
3. Install three washers (Figure 6, Item 2) and three nuts (Figure 6, Item 3) to secure mounting bracket (Figure 6, Item 1) to voltage selection switch (Figure 4, Item 6). Torque nuts to 11-12 in•lb (1 N•m).

REMOVE/INSTALL VOLTAGE SELECTION SWITCH – CONTINUED**NOTE**

Identification tags should remain in place until the output box is completely reassembled and has been tested for proper operation.

Apply a thin coat of electrically conductive grease to all electrical connections prior to assembly.

4. Secure wires (Figure 2, Item 4) to voltage selection switch (Figure 4, Item 6) with screws (Figure 2, Item 5) at locations (Figure 5) tagged in removal.
5. Position voltage selection switch (Figure 4, Item 6) to mounting location on output box.
6. Install two screws (Figure 4, Item 5) that secure mounting bracket (Figure 6, Item 1) to output box. Torque screws to 27-34 in•lb (3-6 N•m).
7. Open right-side door.
8. Install four flare nuts (Figure 4, Item 2) that secure voltage selection switch (Figure 4, Item 6) and mounting plate (Figure 4, Item 3) to right-side of output box. Torque nuts to 25-30 in•lb (3-4 N•m).
9. Position voltage selection switch handle (Figure 3, Item 1) and secure with setscrew (Figure 3, Item 2) in center of handle (Figure 3, Item 1).
10. Connect wiring harness (Figure 2, Item 9) to printed circuit board (WP 0058, Remove/Install Printed Circuit Board Module).
11. Position appropriately tagged wire (Figure 2, Item 2) to top of voltage selection switch (Figure 4, Item 6).
12. Install screw (Figure 2, Item 8) and nut (Figure 2, Item 3) that secure wire (Figure 2, Item 2) on top plate of voltage selection switch (Figure 4, Item 6). Torque to 87-105 in•lb (10-12 N•m).
13. Position three wires (Figure 2, Item 7) to voltage selection switch (Figure 4, Item 6) according to tags.
14. Install three screws (Figure 2, Item 1) and three nuts (Figure 2, Item 6) that secure wires (Figure 2, Item 7) to voltage selection switch (Figure 4, Item 6). Torque to 87-105 in•lb (10-12 N•m).
15. Position cover (not shown) over output box.
16. Install five screws (not shown) that secure cover (not shown) over output box.
17. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
18. Close generator set doors.
19. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
20. Start engine and check for proper operation. Bring coolant to normal operating temperature and then apply a 100% rated load for 30 minutes (TM 9-6115-749-10).
21. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
REMOVE/INSTALL HOUR METER

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
Wrench, Torque, Dial, 1/4 in Drive, 30 in•lb (WP 0162, Table 2, Item 42)
Strap, Wrist, Electrostatic Discharge (WP 0162, Table 2, Item 25)

Personnel Required

91D (1)

References

WP 0058, Remove/Install Printed Circuit Board Module

Materials/Parts

Hour meter assembly (WP 0116, Item 3)
Grease, electrically conductive (WP 0163, Table 1, Item 20)
Tag, marker (WP 0163, Table 1, Item 35)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)

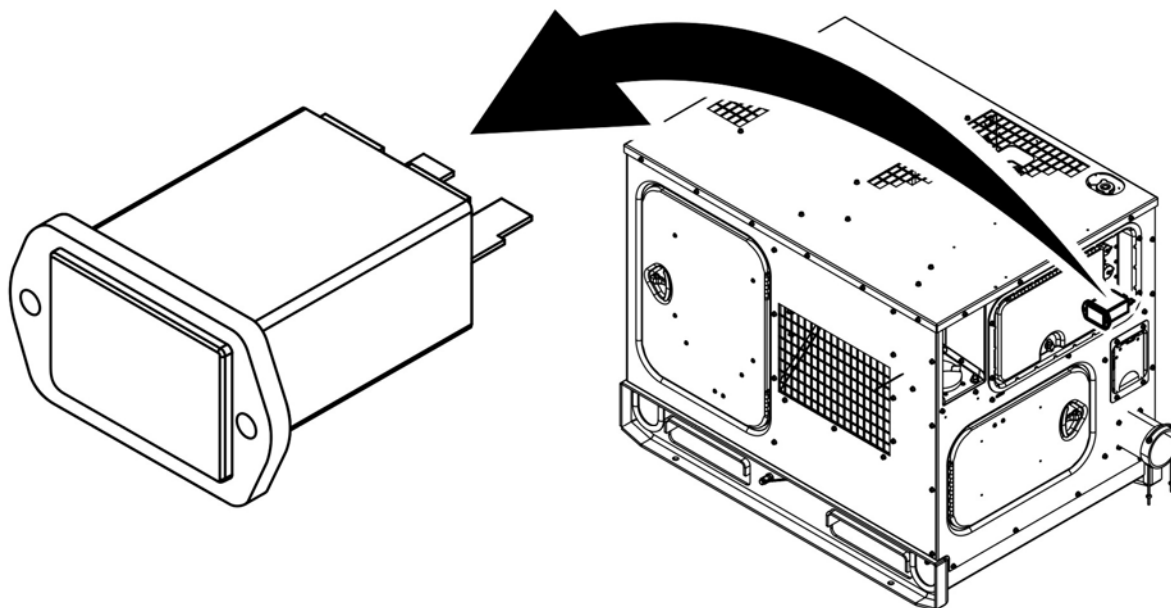
REMOVE/INSTALL HOUR METER**Remove Hour Meter**

Figure 1. Hour Meter - Location.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Open output box.
3. Remove five screws (not shown) that secure cover (not shown) of output box.

REMOVE/INSTALL HOUR METER – CONTINUED

4. Remove cover from output box.
5. Open rear door.
6. Locate hour meter (Figure 1).

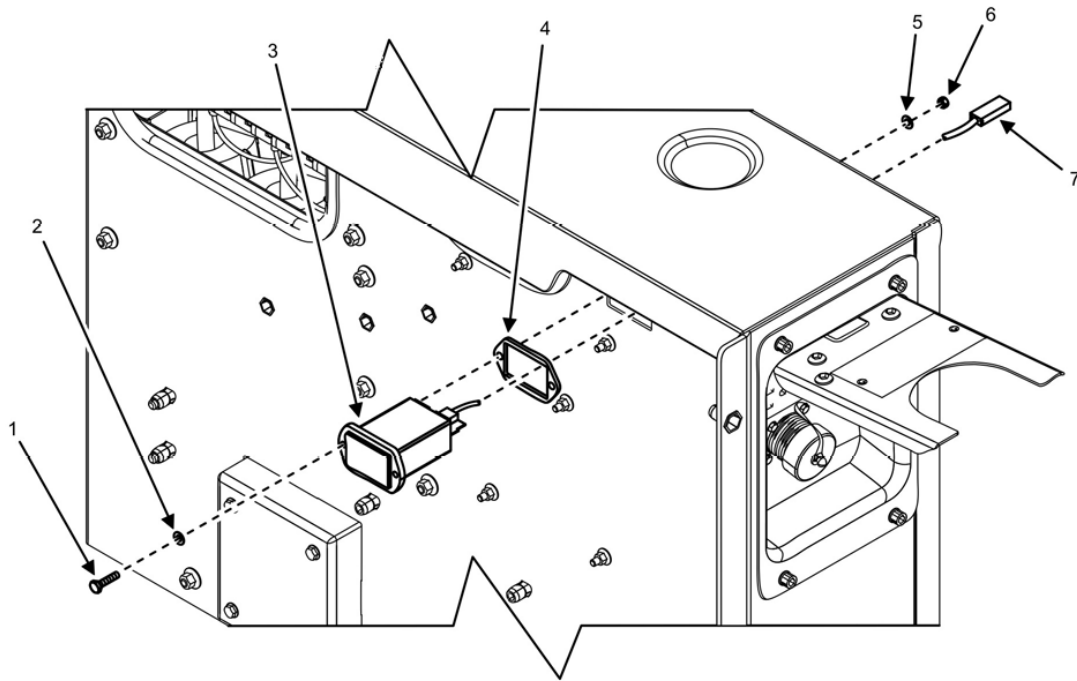


Figure 2. Hour Meter - Detail.

CAUTION

Printed circuit board contains components that are sensitive to static electricity. Always wear an antistatic wrist strap connected to a metal surface to channel static electricity to ground when handling printed circuit board. Failure to comply may cause damage to equipment.

NOTE

Prior to disassembly, tag all electrical wires, cables, and connectors for identification. Tags will be used as a guide during reassembly.

7. Tag and disconnect wiring harness (Figure 2, Item 7) from printed circuit board module (not shown) of output box (WP 0058, Remove/Install Printed Circuit Board Module).

NOTE

Hour meter wiring harness and mounting gasket are supplied with replacement hour meter.

8. Remove two nuts (Figure 2, Item 6) and two washers (Figure 2, Item 5) from inside the output box and two screws (Figure 2, Item 1) and two washers (Figure 2, Item 2) from the rear of the output box that secure hour meter (Figure 2, Item 3) to back wall of output box.
9. Remove hour meter (Figure 2, Item 3), gasket (Figure 2, Item 4), and wiring harness (Figure 2, Item 7) from output box. Discard gasket (Figure 2, Item 4).

REMOVE/INSTALL HOUR METER – CONTINUED**END OF TASK****Inspect Hour Meter**

1. Inspect hour meter (Figure 2, Item 3) and wiring harness (Figure 2, Item 7) for signs of obvious damage. Replace as required.
2. Inspect all mounting hardware for signs of obvious damage. Replace as required.

END OF TASK**Install Hour Meter**

1. Position hour meter (Figure 2, Item 3), new gasket (Figure 2, Item 4), and wiring harness (Figure 2, Item 7) to mounting locations in output box and align the mounting holes.
2. Secure hour meter (Figure 2, Item 3) to output box by installing two screws (Figure 2, Item 1) and two washers (Figure 2, Item 2) to the back of output box and two washers (Figure 2, Item 5) and nuts (Figure 2, Item 6) to inside output box. Torque to 5-8 in•lb (0.6-0.9 N•m).

CAUTION

Printed circuit board contains components that are sensitive to static electricity. Always wear an antistatic wrist strap connected to a metal surface to channel static electricity to ground when handling printed circuit board. Failure to comply may cause damage to equipment.

NOTE

Identification tags should remain in place until the output box is completely reassembled and has been tested for proper operation.

Apply a thin coat of electrically conductive grease to all electrical connections prior to assembly.

3. Apply a thin coat of electrically conductive grease to wiring harness (Figure 2, Item 7).
4. Install wiring harness (Figure 2, Item 7) to printed circuit board module (not shown) using identification tags installed during removal as a guide (WP 0058, Remove/Install Printed Circuit Board Module).
5. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
6. Close generator set doors.
7. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
8. Start engine and check for proper operation (TM 9-6115-749-10).
9. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

REMOVE/INSTALL CONVENIENCE RECEPTACLE

INITIAL SETUP:**Tools and Special Tools**

Screwdriver, Torx, T20, 3 in Long (WP 0162, Table 2, Item 23)
 Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
 Wrench, Torque, Dial, 1/4 in Drive, 30 in•lb (WP 0162, Table 2, Item 42)
 Wrench, Torque, Dial, 3/8 in Drive, 300 in•lb (WP 0162, Table 2, Item 43)

Personnel Required

91D (1)

References

WP 0053, Remove/Install Output Terminal Board
 WP 0058, Remove/Install Printed Circuit Board Module

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool
 Battery ground cable removed (WP 0036, Remove/Install Batteries)

Materials/Parts

Boot, terminal circuit breaker (WP 0117, Item 27)
 Interrupter, ground fault 50/60 Hz (WP 0117, Item 31)
 Interrupter, ground fault 400 Hz (WP 0117, Item 30)
 Receptacle, duplex (WP 0117, Item 15)
 Washer, flat M4 (WP 0117, Item 2)
 Washer, lock 1/4 ext tooth (WP 0117, Item 11)
 Grease, electrically conductive (WP 0163, Table 1, Item 20)
 Tag, marker (WP 0163, Table 1, Item 35)

REMOVE/INSTALL CONVENIENCE RECEPTACLE**WARNING**

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Do not ground yourself in standing water. Failure to comply may cause injury or death to personnel and damage to equipment.

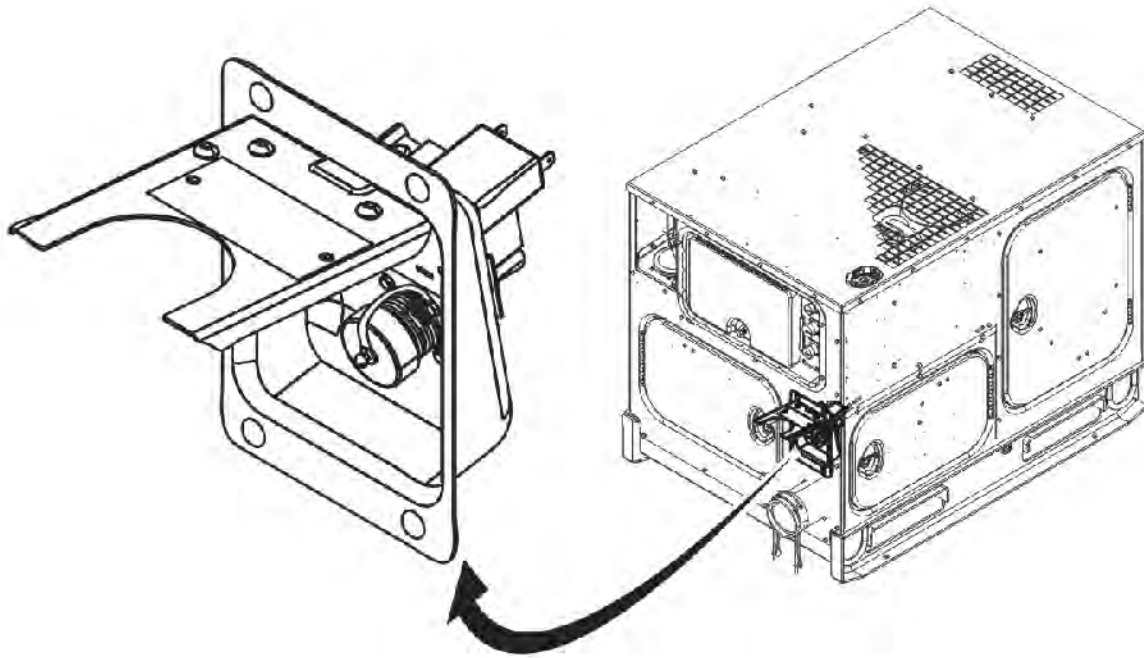
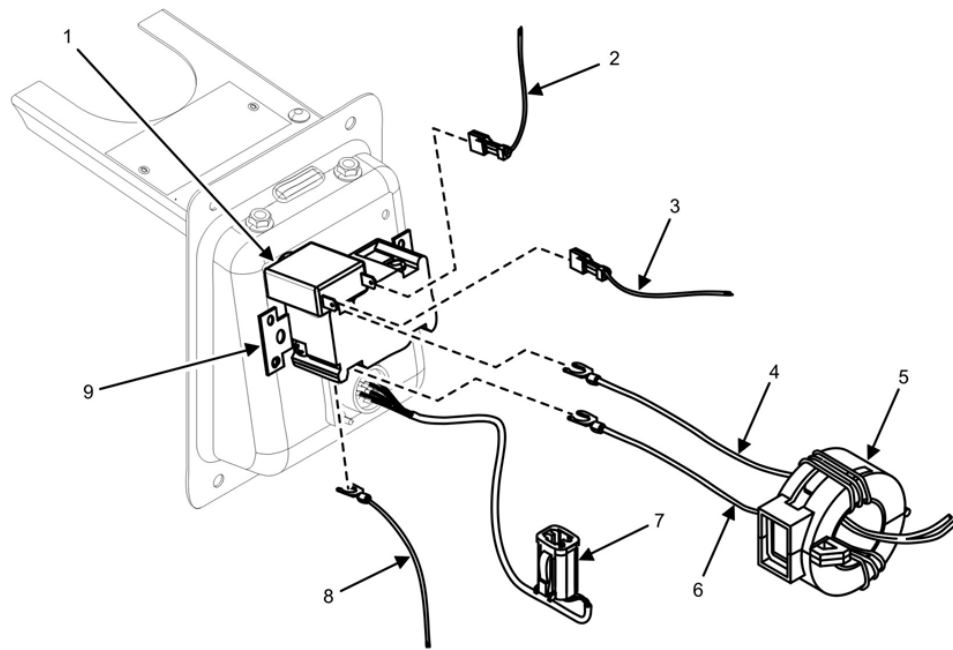
REMOVE/INSTALL CONVENIENCE RECEPTACLE – CONTINUED**Remove Convenience Receptacle Housing**

Figure 1. Convenience Receptacle - Location.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate convenience receptacle (Figure 1) on rear body panel of generator set.
3. Remove four screws (Figure 3, Item 10) securing convenience receptacle housing (Figure 3, Item 9) to rear panel.
4. Position convenience receptacle housing (Figure 3, Item 9) to gain access to wiring.

REMOVE/INSTALL CONVENIENCE RECEPTACLE – CONTINUED**Figure 2. Convenience Receptacle Rear - Removal.****NOTE**

To assist installation, tag all electrical wires and connectors prior to removal.

5. Loosen screw (not shown) and tag and remove GND wire (Figure 2, Item 8) from convenience receptacle (Figure 2, Item 9).

NOTE

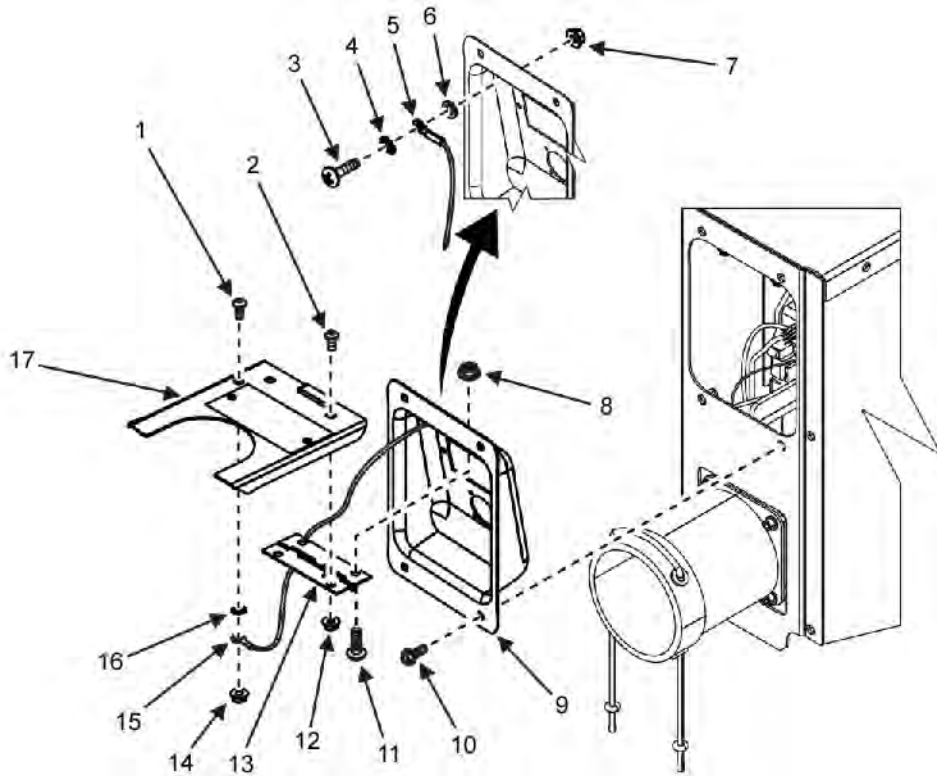
Two GFI wires (Figure 2, Items 4 and 6) pass through GFI choke filter (Figure 2, Item 5) three times.

6. Loosen screw (not shown) and tag and GFI wire (Figure 2, Item 6) from convenience receptacle (Figure 2, Item 9).

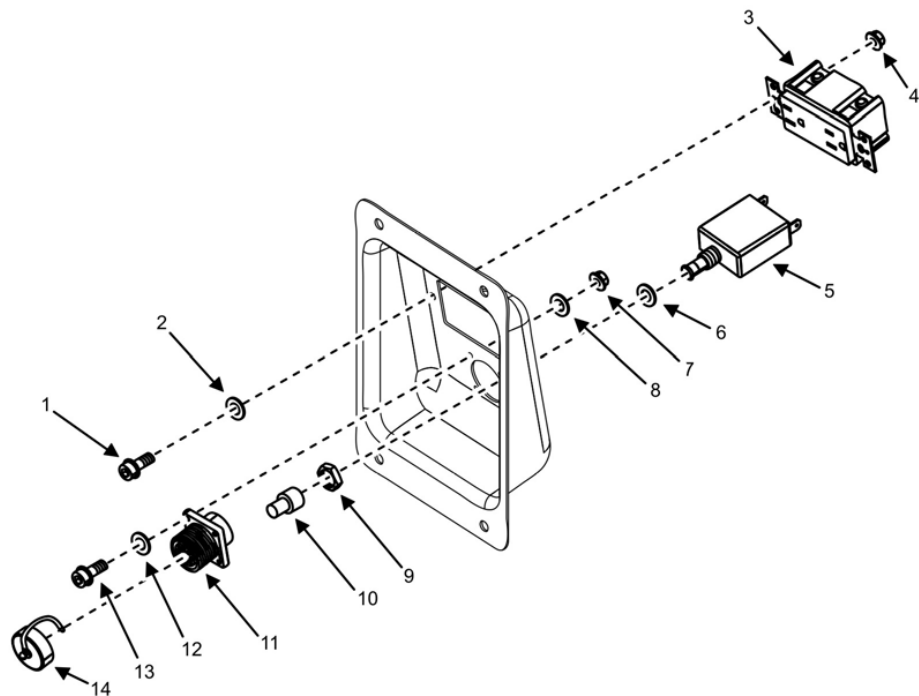
CAUTION

Printed circuit board contains components that are sensitive to static electricity. Always wear an antistatic wrist strap connected to a metal surface to channel static electricity to ground when handling printed circuit board. Failure to comply may cause damage to equipment.

7. Tag and remove GFI wire (Figure 2, Item 3) from rear of circuit breaker (Figure 2, Item 1).
8. Tag and remove L1 wire (Figure 2, Item 2) from rear of circuit breaker (Figure 2, Item 1).
9. Tag and disconnect switch box contactor receptacle wiring harness (Figure 2, Item 7) at printed circuit board module (not shown) (WP 0058, Remove/Install Printed Circuit Board Module).
10. Loosen screw (not shown) and tag and remove GFI wire (Figure 2, Item 4) from convenience receptacle (Figure 2, Item 9).
11. Remove convenience receptacle housing (Figure 3, Item 9) from rear panel and place on suitable surface.

REMOVE/INSTALL CONVENIENCE RECEPTACLE – CONTINUED**END OF TASK****Disassemble Convenience Receptacle Housing****Figure 3. Convenience Receptacle - Removal.**

1. Remove screw (Figure 3, Item 3), external tooth lockwasher (Figure 3, Item 4), flat washer (Figure 3, Item 6), and nut (Figure 3, Item 7) that secure ground strap (Figure 3, Item 5) to back of convenience receptacle housing (Figure 3, Item 9).
2. Discard external tooth lockwasher (Figure 3, Item 4).
3. Remove screw (Figure 3, Item 1), external tooth lockwasher (Figure 3, Item 16), and nut (Figure 3, Item 14) that secure ground strap (Figure 3, Item 15) to convenience receptacle housing cover (Figure 3, Item 17).
4. Discard external tooth lockwasher (Figure 3, Item 16).
5. Remove two screws (Figure 3, Item 11) and two nuts (Figure 3, Item 8) that secure convenience receptacle housing cover (Figure 3, Item 17) and hinge (Figure 3, Item 13) to convenience receptacle housing (Figure 3, Item 9).
6. Remove two screws (Figure 3, Item 2) and two nuts (Figure 3, Item 12) that attach convenience receptacle housing cover (Figure 3, Item 17) to hinge (Figure 3, Item 13).
7. Remove four nuts (Figure 4, Item 7) and four flat washers (Figure 4, Item 8) that secure switch box contactor receptacle (Figure 4, Item 11) and cap (Figure 4, Item 14) to convenience receptacle housing (Figure 3, Item 9).
8. Remove four screws (Figure 4, Item 13) and four flat washers (Figure 4, Item 12) that secure switch box contactor receptacle (Figure 4, Item 11) and cap (Figure 4, Item 14) to convenience receptacle housing (Figure 3, Item 9).

REMOVE/INSTALL CONVENIENCE RECEPTACLE – CONTINUED**Figure 4. Convenience Receptacle Components - Removal.**

9. Remove switch box contactor receptacle (Figure 4, Item 11) and cap (Figure 4, Item 14) from convenience receptacle housing (Figure 3, Item 9).
10. Remove circuit breaker boot (Figure 4, Item 10), mounting nut (Figure 4, Item 9), and washer (Figure 4, Item 6) that secure circuit breaker (Figure 4, Item 5) to convenience receptacle housing (Figure 3, Item 9).
11. Discard circuit breaker boot (Figure 4, Item 10).
12. Remove two screws (Figure 4, Item 1), two flat washers (Figure 4, Item 2), and two flange nuts (Figure 4, Item 4) that secure convenience receptacle (Figure 4, Item 3) to convenience receptacle housing (Figure 3, Item 9).
13. Remove convenience receptacle (Figure 4, Item 3) from convenience receptacle housing (Figure 3, Item 9).

END OF TASK**Inspect Convenience Receptacle**

1. Inspect convenience receptacle housing (Figure 3, Item 9) for dents, cracks, or other signs of damage and replace as required.
2. Inspect convenience receptacle housing cover (Figure 3, Item 17) for dents, cracks, or other signs of damage. Replace as required.
3. Inspect hinge (Figure 3, Item 13) for functionality and replace as required.
4. Inspect switch box contactor receptacle (Figure 4, Item 11) for signs of damage and replace as required.
5. Inspect switch box contactor receptacle wiring harness (Figure 2, Item 7) for frayed wires and other signs of damage. Replace switch box contactor receptacle (Figure 4, Item 11) as required.
6. Inspect convenience receptacle (Figure 4, Item 3) for cracks and damage and replace as required.

REMOVE/INSTALL CONVENIENCE RECEPTACLE – CONTINUED

7. Inspect circuit breaker (Figure 4, Item 5) for cracks and damage and replace as required.
8. Inspect all wires for damage and replace as required.
9. Inspect all mounting hardware and replace as required.

END OF TASK**Assemble Convenience Receptacle Housing**

1. Position convenience receptacle (Figure 4, Item 3) to mounting position on convenience receptacle housing (Figure 3, Item 9).
2. Secure convenience receptacle (Figure 4, Item 3) to convenience receptacle housing (Figure 3, Item 9) by installing two screws (Figure 4, Item 1), two flat washers (Figure 4, Item 2), and two flange nuts (Figure 4, Item 4). Torque flange nuts (Figure 4, Item 4) to 25-39 in•lb (3-6 N•m).
3. Position circuit breaker (Figure 4, Item 5) to mounting position on convenience receptacle housing (Figure 3, Item 9).
4. Secure circuit breaker (Figure 4, Item 5) to convenience receptacle housing (Figure 3, Item 9) by installing washer (Figure 4, Item 6), mounting nut (Figure 4, Item 9), and new circuit breaker boot (Figure 4, Item 10).
5. Position switch box contactor receptacle (Figure 4, Item 11) and cap (Figure 4, Item 14) to mounting position on convenience receptacle housing (Figure 3, Item 9).
6. Install switch box contactor receptacle (Figure 4, Item 11) with four screws (Figure 4, Item 13) and four flat washers (Figure 4, Item 12) to front of switch box contactor receptacle (Figure 4, Item 11).
7. Install four washers (Figure 4, Item 8) and four nuts (Figure 4, Item 7) to rear of switch box contactor receptacle (Figure 4, Item 11). Tighten four nuts (Figure 4, Item 7).
8. Install two screws (Figure 3, Item 2) and two nuts (Figure 3, Item 12) that attach convenience receptacle housing cover (Figure 3, Item 17) and hinge (Figure 3, Item 13). Torque screws (Figure 3, Item 2) to 87-105 in•lb (10-12 N•m).
9. Install two screws (Figure 3, Item 11) and two nuts (Figure 3, Item 8) that secure convenience receptacle housing cover (Figure 3, Item 17) and hinge (Figure 3, Item 13) to convenience receptacle housing (Figure 3, Item 9). Torque screws (Figure 3, Item 11) to 87-105 in•lb (10-12 N•m).
10. Install screw (Figure 3, Item 1), new external tooth lockwasher (Figure 3, Item 16), and nut (Figure 3, Item 14) that secure ground strap (Figure 3, Item 15) to convenience receptacle housing cover (Figure 3, Item 17). Torque screws (Figure 3, Item 1) to 87-105 in•lb (10-12 N•m).
11. Install screw (Figure 3, Item 3), new external tooth lockwasher (Figure 3, Item 4), flat washer (Figure 3, Item 6), and nut (Figure 3, Item 7) that secure ground strap (Figure 3, Item 5) to back of convenience receptacle housing (Figure 3, Item 9). Torque screws (Figure 3, Item 3) to 25-39 in•lb (3-4 N•m).

END OF TASK**Install Convenience Receptacle Housing**

1. Position convenience receptacle housing (Figure 3, Item 9) to mounting position on rear panel.

NOTE

Use tags installed on electrical wires and connectors prior to removal as a guide at installation. Remove tags once components have been installed.

REMOVE/INSTALL CONVENIENCE RECEPTACLE – CONTINUED

Two GFI wires (Figure 2, Items 4 and 6) pass through GFI choke filter (Figure 2, Item 5) three times.

2. Install GFI wires (Figure 2, Items 4 and 6) to convenience receptacle (Figure 2, Item 9) and secure with screws (not shown), ensuring each GFI wire (Figure 2, Item 4) passes through GFI choke filter (Figure 2, Item 5) three times.
3. Install GND wire (Figure 2, Item 8) to convenience receptacle (Figure 2, Item 9).
4. Secure convenience receptacle housing (Figure 3, Item 9) to rear panel by installing four screws (Figure 3, Item 10).
5. Install GFI wire (Figure 2, Item 3) to circuit breaker (Figure 2, Item 1).
6. Install L1 wire (Figure 2, Item 2) to circuit breaker (Figure 2, Item 1).
7. Connect switch box contactor receptacle wiring harness (Figure 2, Item 7) to printed circuit board module using identification tags installed during removal as a guide (WP 0058, Remove/Install Printed Circuit Board Module).
8. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
9. Close generator set doors.
10. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
11. Start engine and check for proper operation (TM 9-6115-749-10).
12. Repair as required.

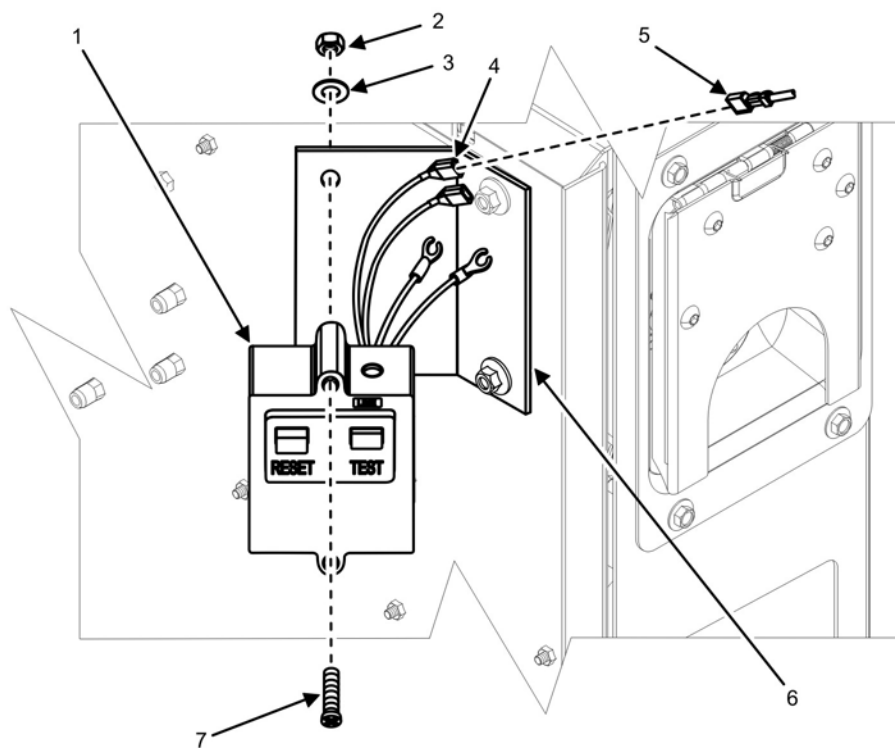
END OF TASK**Remove Convenience Receptacle GFI**

Figure 5. Convenience Receptacle Components GFI - Removal.

REMOVE/INSTALL CONVENIENCE RECEPTACLE – CONTINUED**NOTE**

Tag all wires and connectors prior to removal as a guide at installation.

1. Open rear access door.
2. Tag and loosen two screws and remove two GFI wires (Figure 2, Items 4 and 6) from convenience receptacle (Figure 2, Item 9) and GFI wire (Figure 2, Item 3) from rear of circuit breaker (Figure 2, Item 1). See Remove Convenience Receptacle Housing and Disassemble Convenience Receptacle Housing tasks.
3. Remove wire (Figure 5, Item 4) of GFI (Figure 5, Item 1) from neutral lead (Figure 5, Item 5).
4. Withdraw four wires through output box opening.
5. Remove two screws (Figure 5, Item 7), two flat washers (Figure 5, Item 3), and two nuts (Figure 5, Item 2) from GFI (Figure 5, Item 1).
6. Remove GFI (Figure 5, Item 1) from mounting bracket (Figure 5, Item 6).
7. Inspect GFI (Figure 5, Item 1) and replace as required.

END OF TASK**Install Convenience Receptacle GFI****NOTE**

Use tags installed on wires and connectors prior to removal as a guide at installation.

Remove tags once unit has been reassembled and tested for proper operation.

1. Position GFI (Figure 5, Item 1) to mounting bracket (Figure 5, Item 6) and align mounting holes.
2. Insert two screws (Figure 5, Item 7) through GFI (Figure 5, Item 1) into mounting bracket (Figure 5, Item 5).
3. Install two flat washers (Figure 5, Item 3) and two nuts (Figure 5, Item 2) to rear of GFI (Figure 5, Item 1). Tighten two nuts (Figure 5, Item 2).
4. Insert four wires of GFI (Figure 5, Item 1) through output box opening.
5. Install two wires (Figure 2, Items 4 and 8) to convenience receptacle (Figure 2, Item 9) and one GFI wire (Figure 2, Item 5) to rear of circuit breaker (Figure 2, Item 1) according to tags. See Install Convenience Receptacle Housing and Assemble Convenience Receptacle Housing tasks.
6. Install wire (Figure 5, Item 4) to neutral lead (Figure 5, Item 5).
7. Close rear access door of generator set.
8. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
9. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
10. Start engine and check for proper operation (TM 9-6115-749-10).
11. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
REMOVE/INSTALL CURRENT TRANSFORMERS

INITIAL SETUP:**Test Equipment**

Load Bank (WP 0162, Table 2, Item 2)

Personnel Required

91D (1)
Assistant (1)

Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
Wrench, Torque, Dial, 1/4 in Drive, 30 in•lb (WP 0162, Table 2, Item 42)
Wrench, Torque, Dial, 3/8 in Drive, 300 in•lb (WP 0162, Table 2, Item 43)
Strap, Wrist, Electrostatic Discharge (WP 0162, Table 2, Item 25)

References

WP 0053, Remove/Install Output Terminal Board
WP 0058, Remove/Install Printed Circuit Board Module

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)
Right-side body panel removed (WP 0032, Remove/Install Right-side Body Panel)

Materials/Parts

Transformer, current 105 AMP (3) (WP 0118, Item 4)
Grease, electrically conductive (WP 0163, Table 1, Item 20)

REMOVE/INSTALL CURRENT TRANSFORMERS**Remove Current Transformers**

1. Ensure equipment conditions are met in order presented in initial setup.
2. Remove cable entry guard (WP 0053, Remove/Install Output Terminal Board).
3. Locate current transformers (Figure 1).

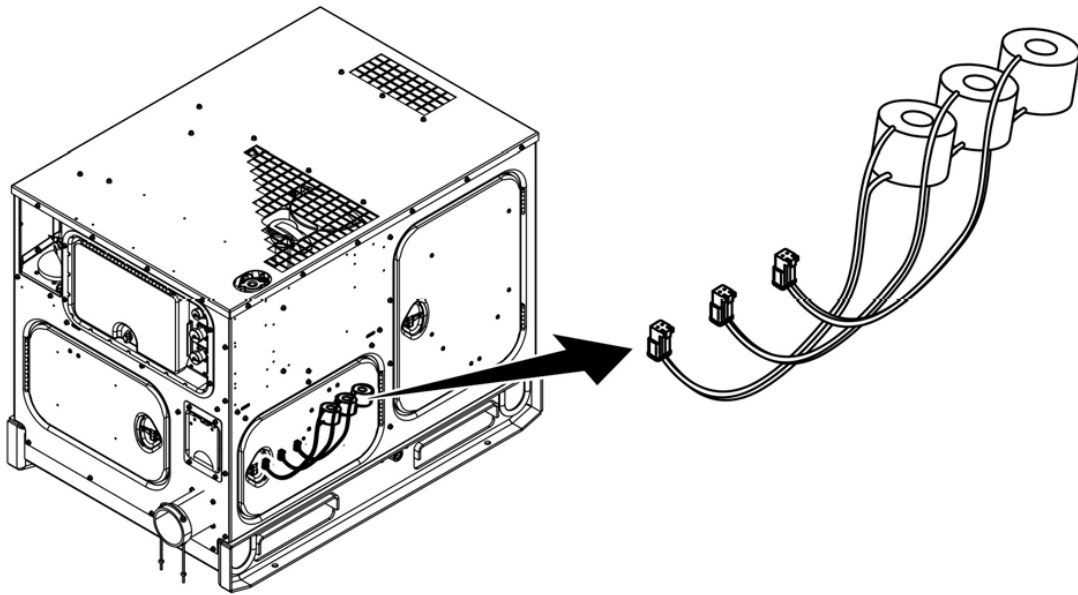
REMOVE/INSTALL CURRENT TRANSFORMERS – CONTINUED

Figure 1. Current Transformers - Location.

4. Remove two short screws (Figure 2, Item 7) and two long screws (Figure 2, Item 5) that secure transformer top bracket (Figure 2, Item 6) to transformer bottom bracket (Figure 2, Item 1).
5. Remove transformer top bracket (Figure 2, Item 6) from output box.

CAUTION

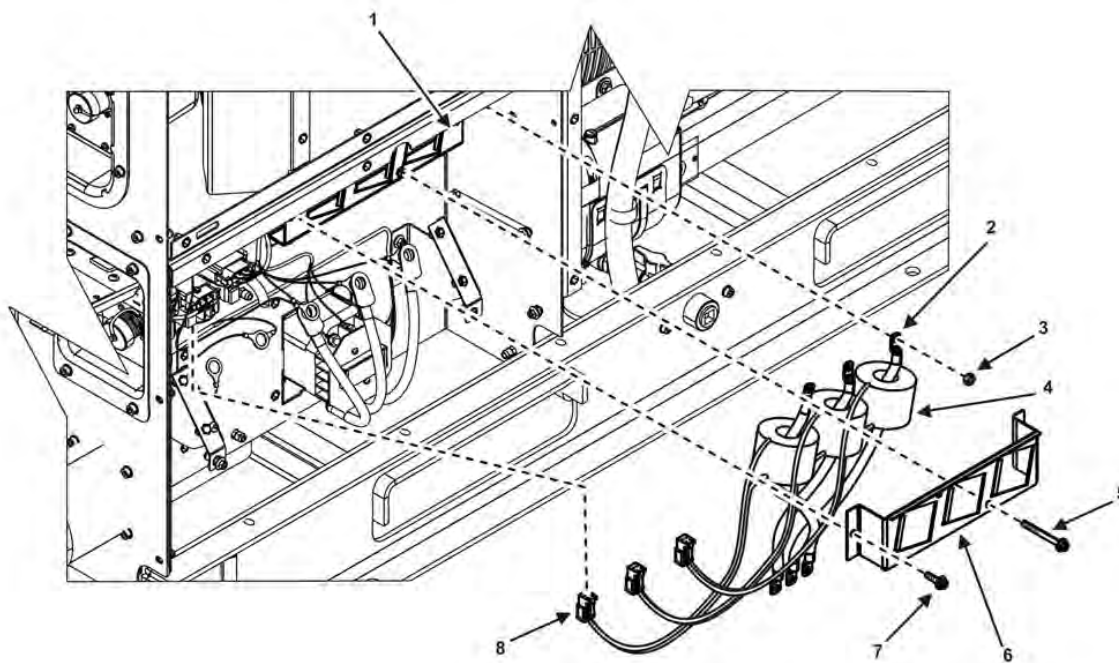
Printed circuit board contains components that are sensitive to static electricity. Always wear an antistatic wrist strap connected to a metal surface to channel static electricity to ground when handling printed circuit board. Failure to comply may cause damage to equipment.

NOTE

Prior to disassembly, tag all electrical wires, cables, and connectors for identification. Tags will be used as a guide during reassembly.

Transformer electrical wires (Figure 2, Item 8) are permanently attached to current transformers (Figure 2, Item 4). If transformer electrical wires (Figure 2, Item 8) are damaged beyond repair, replace current transformer (Figure 2, Item 4).

6. Tag and disconnect transformer electrical wires (Figure 2, Item 8) from printed circuit board module (not shown) (WP 0058, Remove/Install Printed Circuit Board Module).
7. Inspect transformer electrical wires (Figure 2, Item 8) and replace current transformer (Figure 2, Item 4) as required.
8. Tag three electrical leads (Figure 2, Item 2) to voltage selection switch (not shown).
9. Remove three nuts (Figure 2, Item 3) securing electrical leads (Figure 2, Item 2) to voltage selection switch (not shown).

REMOVE/INSTALL CURRENT TRANSFORMERS – CONTINUED**Figure 2. Transformer - Removal.**

10. Remove three electrical leads (Figure 2, Item 2) to voltage selection switch (not shown).
11. Inspect three electrical leads (Figure 2, Item 2) for damage and replace as required.

CAUTION

Orientation of current transformers (Figure 2, Item 4) must be tagged prior to removal. X1 marking faces the top of the output box. Transformers are to be installed to the orientation they were removed. Failure to comply may cause damage to equipment.

NOTE

Prior to removal, tag orientation of current transformers (Figure 2, Item 4). Tags will be used as a guide during reassembly.

12. Tag and remove three current transformers (Figure 2, Item 4) from transformer bottom bracket (Figure 2, Item 1) mounted in output box.

END OF TASK**Inspect Transformers**

1. Inspect transformer bottom bracket (Figure 2, Item 1) in output box for signs of obvious damage. Replace as required.
2. Inspect three current transformers (Figure 2, Item 4) for signs of obvious damage. Replace as required.
3. Inspect three current transformers (Figure 2, Item 4) by using a multimeter set to test ohms to check resistance between two sleeves of two electrical wires (Figure 2, Item 8) of each current transformer (Figure 2, Item 4).

REMOVE/INSTALL CURRENT TRANSFORMERS – CONTINUED**NOTE**

A measurement value greater than 2 Ω indicates a defective current transformer (Figure 2, Item 4).

4. Replace any current transformer (Figure 2, Item 4) outside of specification.
5. Inspect transformer top bracket (Figure 2, Item 6) for signs of obvious damage. Replace as required.
6. Inspect all mounting hardware for signs of obvious damage. Replace as required.

END OF TASK**Install Transformers****CAUTION**

Orientation of current transformers (Figure 2, Item 4) must be installed to proper orientation. X1 marking faces the top of the output box. Failure to comply may cause damage to equipment.

1. Position three current transformers (Figure 2, Item 4) to transformer bottom bracket (Figure 2, Item 1) in output box with X1 marking facing the top of the output box.

CAUTION

Printed circuit board contains components that are sensitive to static electricity. Always wear an antistatic wrist strap connected to a metal surface to channel static electricity to ground when handling printed circuit board. Failure to comply may cause damage to equipment.

NOTE

Identification tags should remain in place until the output box is completely reassembled and has been tested for proper operation.

Apply a thin coat of electrically conductive grease to all electrical connections prior to assembly.

2. Insert electrical leads (Figure 2, Item 2) through current transformers (Figure 2, Item 4) to mounting location on voltage selection switch (not shown) using identifications tags installed during removal as a guide.
3. Apply a thin coat of electrically conductive grease to electrical leads (Figure 2, Item 2).
4. Secure electrical leads (Figure 2, Item 2) to voltage selection switch (not shown) with three nuts (Figure 2, Item 3).
5. Torque nuts (Figure 2, Item 3) to 87-105 in•lb (10-12 N•m).
6. Connect transformer electrical wires (Figure 2, Item 8) to printed circuit board module (not shown) using identification tags installed during removal as a guide (WP 0058, Remove/Install Printed Circuit Board Module).

NOTE

Transformer top bracket (Figure 2, Item 6) is properly oriented over current transformers (Figure 2, Item 4) when the lip is facing the top of the unit.

7. Position transformer top bracket (Figure 2, Item 6) over current transformers (Figure 2, Item 4).
8. Secure transformer top bracket (Figure 2, Item 6) with two short screws (Figure 2, Item 7) and two long screws (Figure 2, Item 5).
9. Torque short screws (Figure 2, Item 7) to 20-31 in•lb (3-4 N•m).

REMOVE/INSTALL CURRENT TRANSFORMERS – CONTINUED

10. Torque long screws (Figure 2, Item 5) to 87-105 in•lb (10-12 N•m).
11. Install cable entry guard (WP 0053, Remove/Install Output Terminal Board).
12. Install right-side body panel (WP 0032, Remove/Install Right-side Panel).
13. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
14. Close generator set doors.
15. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
16. Start engine and check for proper operation. Bring coolant to normal operating temperature and then apply a 100% rated load for 30 minutes (TM 9-6115-749-10).
17. Repair as required.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE**REMOVE/INSTALL PRINTED CIRCUIT BOARD MODULE**

INITIAL SETUP:**Tools and Special Tools**

Strap, Wrist, Electrostatic Discharge (WP 0162, Table 2, Item 25)
Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
Wrench, Torque, Dial, 1/4 in Drive, 30 in•lb (WP 0162, Table 2, Item 42)
Wrench, Torque, Click, Ratcheting, 3/8 in Drive, 75 ft•lb (WP 0162, Table 2, Item 41)

Materials/Parts

Module, printed circuit board (1) (WP 0119, Item 3)
Grease, electrically conductive (WP 0163, Table 1, Item 20)
Tag, marker (WP 0163, Table 1, Item 35)

Personnel Required

91D (1)
Assistant (1)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)
Right-side body panel removed (WP 0032, Remove/Install Right-side Body Panel)
Output terminal board removed (WP 0053, Remove/Install Output Terminal Board)

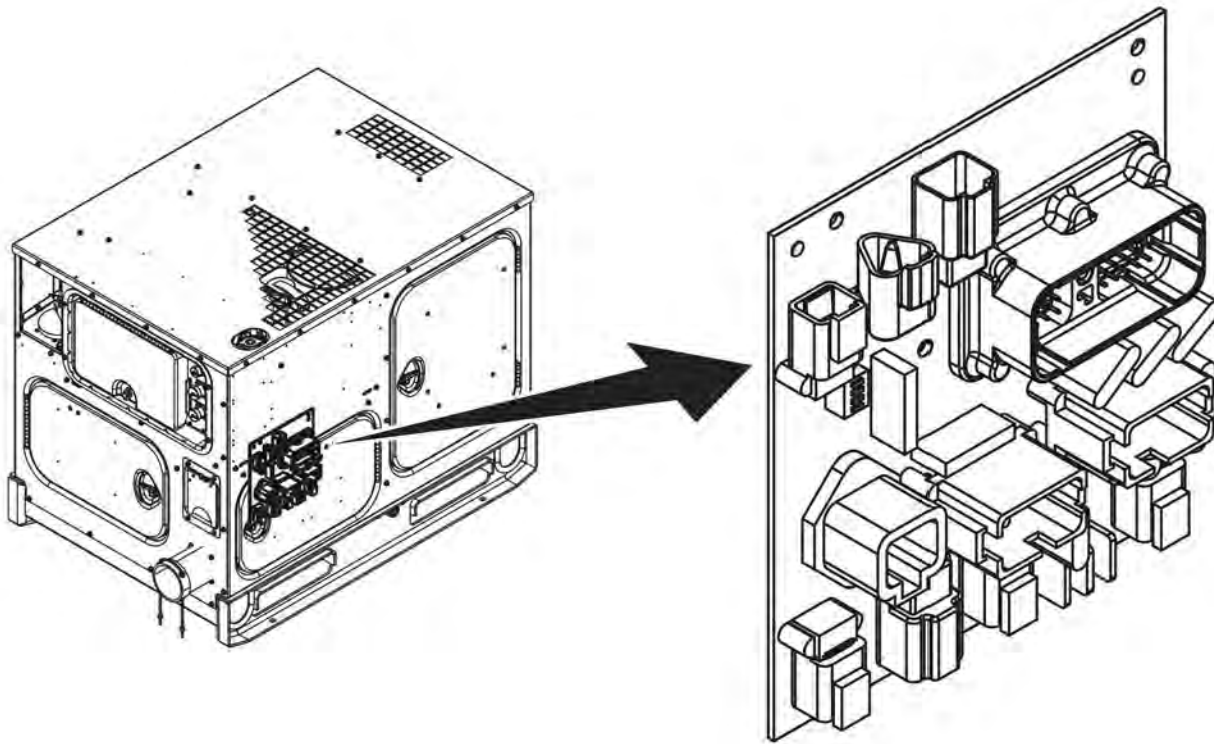
REMOVE/INSTALL PRINTED CIRCUIT BOARD MODULE**Remove Printed Circuit Board Module**

Figure 1. Printed Circuit Board Module - Location.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate printed circuit board module (Figure 1).

NOTE

Prior to disassembly, tag and identify all wiring harnesses and electrical leads according to markings on printed circuit board module (Figure 2). Tags will be used as a guide during reassembly.

REMOVE/INSTALL PRINTED CIRCUIT BOARD MODULE – CONTINUED

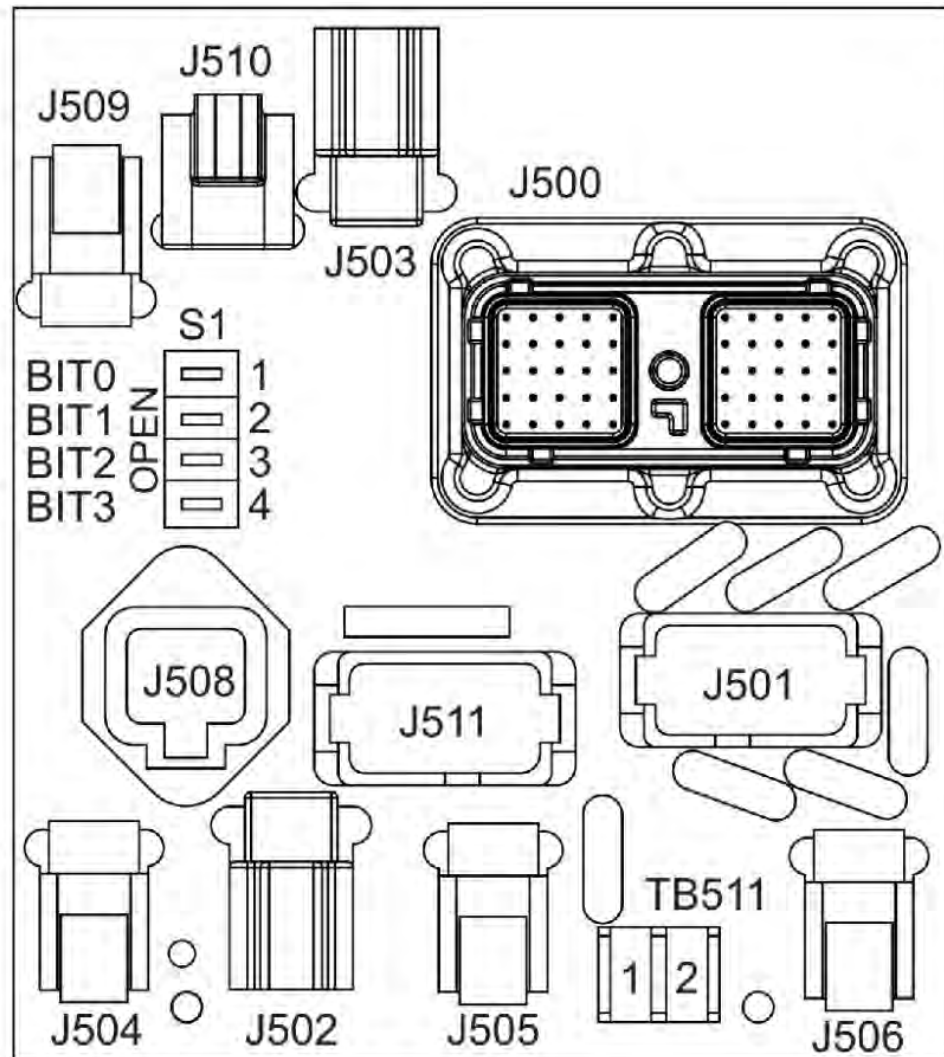


Figure 2. Printed Circuit Board Module Wiring Labels.

REMOVE/INSTALL PRINTED CIRCUIT BOARD MODULE – CONTINUED

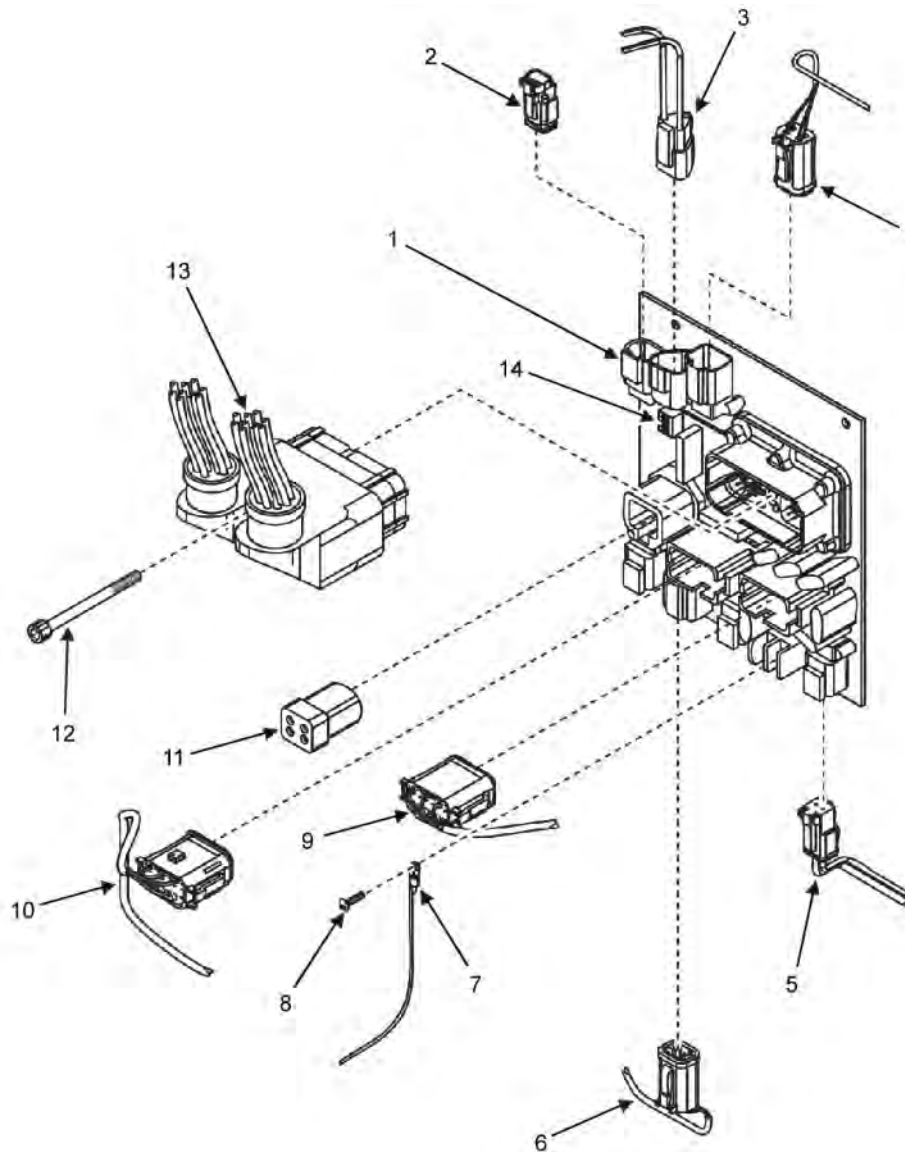


Figure 3. Printed Circuit Board Module Wiring - Removal.

CAUTION

Printed circuit board module contains components that are sensitive to static electricity. Always wear an antistatic wrist strap connected to a metal surface to channel static electricity to ground when handling printed circuit board. Failure to comply may cause damage to equipment.

3. Tag and remove wiring harness (Figure 3, Item 3) from printed circuit board module (Figure 3, Item 1) to hour meter (not shown).
4. Inspect hour meter wiring harness (Figure 3, Item 3) for frayed wires and other signs of obvious damage and replace as required.

REMOVE/INSTALL PRINTED CIRCUIT BOARD MODULE – CONTINUED

5. Tag and remove wiring harness (Figure 3, Item 4) from printed circuit board module (Figure 3, Item 1) to voltage selection switch (not shown).
6. Inspect voltage selection switch wiring harness (Figure 3, Item 4) for frayed wires and other signs of obvious damage and replace as required.
7. Tag wiring harness (Figure 3, Item 13) from printed circuit board module (Figure 3, Item 1) to DCS (not shown).
8. Remove screw (Figure 3, Item 12) securing DCS wiring harness (Figure 3, Item 13) to printed circuit board module (Figure 3, Item 1).
9. Remove DCS wiring harness (Figure 3, Item 13) from printed circuit board module (Figure 3, Item 1).
10. Inspect DCS wiring harness (Figure 3, Item 13) for frayed wires and other signs of obvious damage and replace as required.
11. Tag and remove wiring harness (Figure 3, Item 10) from printed circuit board module (Figure 3, Item 1) to N terminal (not shown) and contactor (not shown).
12. Inspect N terminal and contactor wiring harness (Figure 3, Item 10) for frayed wires and other signs of obvious damage and replace as required.
13. Tag and remove wiring harness (Figure 3, Item 9) from printed circuit board module (Figure 3, Item 1) to contactor (not shown) and line terminals (not shown).
14. Inspect contactor and line terminals wiring harness (Figure 3, Item 9) for frayed wires and other signs of obvious damage and replace as required.
15. Tag and remove three wiring harnesses (Figure 3, Item 5) from printed circuit board module (Figure 3, Item 1) to three transformers (not shown).
16. Inspect three transformer wiring harnesses (Figure 3, Item 5) for frayed wires and other signs of obvious damage and replace as required.
17. Tag and remove wiring harness (Figure 3, Item 6) from printed circuit board module (Figure 3, Item 1) to switch box contactor receptacle (not shown).
18. Inspect switch box contactor receptacle wiring harness (Figure 3, Item 6) for frayed wires and other signs of obvious damage and replace as required.
19. Tag electrical lead (Figure 3, Item 7) from printed circuit board module (Figure 3, Item 1) to ground strap bolt (not shown).
20. Remove screw and washer (Figure 3, Item 8) securing electrical lead (Figure 3, Item 7) to printed circuit board module (Figure 3, Item 1).
21. Remove electrical lead (Figure 3, Item 7) from printed circuit board module (Figure 3, Item 1).
22. Inspect electrical lead (Figure 3, Item 7) for frayed wire and other signs of obvious damage and replace as required.

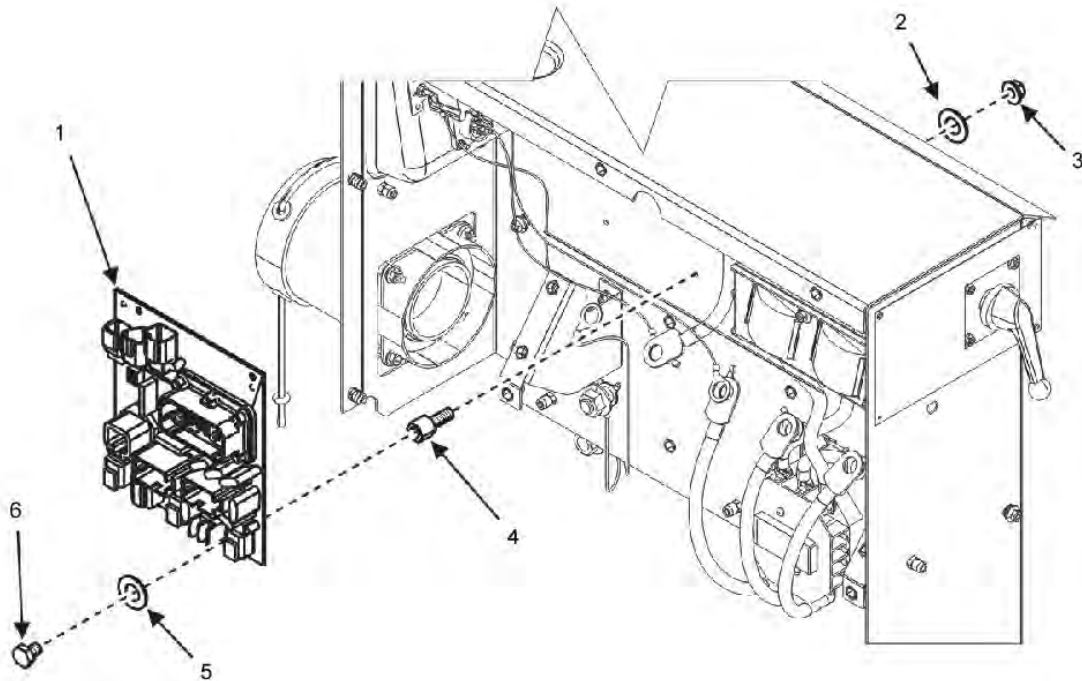
REMOVE/INSTALL PRINTED CIRCUIT BOARD MODULE – CONTINUED

Figure 4. Printed Circuit Board - Removal.

23. Remove five nuts (Figure 4, Item 3) and five washers (Figure 4, Item 2) from back of output box that secure printed circuit board module (Figure 4, Item 1) to output box.
24. Remove printed circuit board module (Figure 4, Item 1) from output box and place on a suitable work surface.
25. Remove five screws (Figure 4, Item 6), five washers (Figure 4, Item 5), and five spacers (Figure 4, Item 4) from printed circuit board module (Figure 4, Item 1).
26. Note and record position of four dip switches (Figure 3, Item 14) on printed circuit board module (Figure 3, Item 1).
27. Tag and remove two plugs (Figure 3, Items 2 and 11) from printed circuit board module (Figure 3, Item 1).

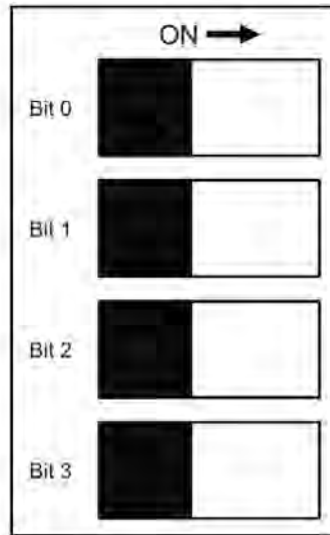
END OF TASK**Inspect Printed Circuit Board Module****CAUTION**

Printed circuit board module contains components that are sensitive to static electricity. Always wear an antistatic wrist strap connected to a metal surface to channel static electricity to ground when handling printed circuit board. Failure to comply may cause damage to equipment.

1. Inspect printed circuit board module (Figure 3, Item 1) for signs of obvious damage. Replace as required.
2. Inspect two plugs (Figure 3, Items 2 and 11) from printed circuit board module for signs of obvious damage. Replace as required.

REMOVE/INSTALL PRINTED CIRCUIT BOARD MODULE – CONTINUED

- Inspect all mounting hardware for signs of obvious damage. Replace as required.

END OF TASK**Install Printed Circuit Board Module****Figure 5. Dip Switch Settings.****CAUTION**

Printed circuit board module contains components that are sensitive to static electricity. Always wear an antistatic wrist strap connected to a metal surface to channel static electricity to ground when handling printed circuit boards/cards. Failure to comply may cause damage to equipment.

NOTE

Dip switch configurations should match Table 1. The dip switch is composed of four switches stacked vertically (Figure 5). The top switch is bit 0 and the bottom switch is bit 3 (Figure 5). In Table 1, 0 refers to the OFF position and 1 to the ON position. Figure 5 shows all switches in the OFF position.

Table 1. 5 kW Dip Switch Configuration.

GENSET HARDWARE CONFIGURATION	BIT 0	BIT 1	BIT 2	BIT 3
5 kW, 50/60 Hz	1	0	0	0
5 kW, 400 Hz	0	1	1	0

- Configure four dip switches (Figure 3, Item 14) located on printed circuit board module (Figure 3, Item 1) using Table 1 and Figure 5 or notes taken during removal as a guide.
- Install two plugs (Figure 3, Items 2 and 11) to printed circuit board module (Figure 3, Item 1) using identification tags installed during removal as a guide.
- Install five flat washers (Figure 4, Item 5) and five screws (Figure 4, Item 6) to printed circuit board module (Figure 4, Item 1).

REMOVE/INSTALL PRINTED CIRCUIT BOARD MODULE – CONTINUED

4. Install five spacers (Figure 4, Item 4) to threads of five screws (Figure 4, Item 6) behind printed circuit board module (Figure 4, Item 1).
5. Position printed circuit board module (Figure 4, Item 1) to mounting location on output box.
6. Install five nuts (Figure 4, Item 3) and five washers (Figure 4, Item 2) to five screws (Figure 4, Item 6) on rear side of output box. Torque nuts (Figure 4, Item 3) to 25-31 in•lb (3-4 N•m).

NOTE

Identification tags should remain in place until the output box is completely re-assembled and has been tested for proper operation.

Apply a thin coat of electrically conductive grease to all electrical connections prior to assembly.

7. Apply a thin coat of electrically conductive grease to all printed circuit board module electrical leads and harnesses.
8. Install hour meter wiring harness (Figure 3, Item 3) to printed circuit board module (Figure 3, Item 1) using identifications tags installed during disassembly as a guide.
9. Install wiring harness (Figure 3, Item 4) from voltage selection switch to printed circuit board module (Figure 3, Item 1) using identifications tags installed during disassembly as a guide.
10. Install wiring harness (Figure 3, Item 13) from DCS to printed circuit board module (Figure 3, Item 1) using identifications tags installed during disassembly as a guide.
11. Secure wiring harness (Figure 3, Item 13) from DCS to printed circuit board module (Figure 3, Item 1) with screw (Figure 3, Item 12).
12. Install wiring harness (Figure 3, Item 10) from N terminal and contactor to printed circuit board module (Figure 3, Item 1) using identifications tags installed during disassembly as a guide.
13. Install wiring harness (Figure 3, Item 9) from terminals and contactor to printed circuit board module (Figure 3, Item 1) using identifications tags installed during disassembly as a guide.
14. Install three wiring harnesses (Figure 3, Item 5) from three transformers to printed circuit board module (Figure 3, Item 1) using identifications tags installed during disassembly as a guide.
15. Install wiring harness (Figure 3, Item 6) from switch box contactor receptacle to printed circuit board module (Figure 3, Item 1) using identifications tags installed during disassembly as a guide.
16. Position electrical lead (Figure 3, Item 7) from ground strap bolt to printed circuit board module (Figure 3, Item 1) using identifications tags installed during disassembly as a guide.
17. Secure electrical lead (Figure 3, Item 7) from ground strap bolt to printed circuit board module (Figure 3, Item 1) with screw and washer (Figure 3, Item 8).
18. Install output terminal board (WP 0053, Remove/Install Output Terminal Board).
19. Install right-side body panel (WP 0032, Remove/Install Right-side Panel).
20. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
21. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
22. Start engine and check for proper operation (TM 9-6115-749-10). Bring coolant to normal operating temperature and then apply a 100% rated load for 30 minutes (TM 9-6115-749-10).
23. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**REMOVE/INSTALL ENGINE WIRING HARNESS**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
Wrench, Torque, Click, Ratcheting, 3/8 in Drive, 75 ft•lb (WP 0162, Table 2, Item 41)

Materials/Parts

Insulation sleeving (WP 0153, Item 12)
Wiring harness (WP 0153, Item 1)
Grease, electrically conductive (WP 0163, Table 1, Item 20)
Strap, tiedown (WP 0163, Table 1, Item 34)
Tag, marker (WP 0163, Table 1, Item 35)

Personnel Required

91D (1)
Assistant (1)

References

WP 0093, General Maintenance

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed and right-side battery removed (WP 0036, Remove/Install Batteries)
Top body panel removed (WP 0028, Remove/Install Top Body Panel)
Left-side body panel removed (WP 0031, Remove/Install Left-side Body Panel)
Right-side body panel removed (WP 0032, Remove/Install Right-side Body Panel)
DCS removed (WP 0017, Remove/Install DCS)
Rear body panel removed (WP 0030, Remove/Install Rear Body Panel)

REMOVE/INSTALL ENGINE WIRING HARNESS**NOTE**

Tag/mark all electrical connections prior to removal. Tags/markings applied at removal will aide at installation.

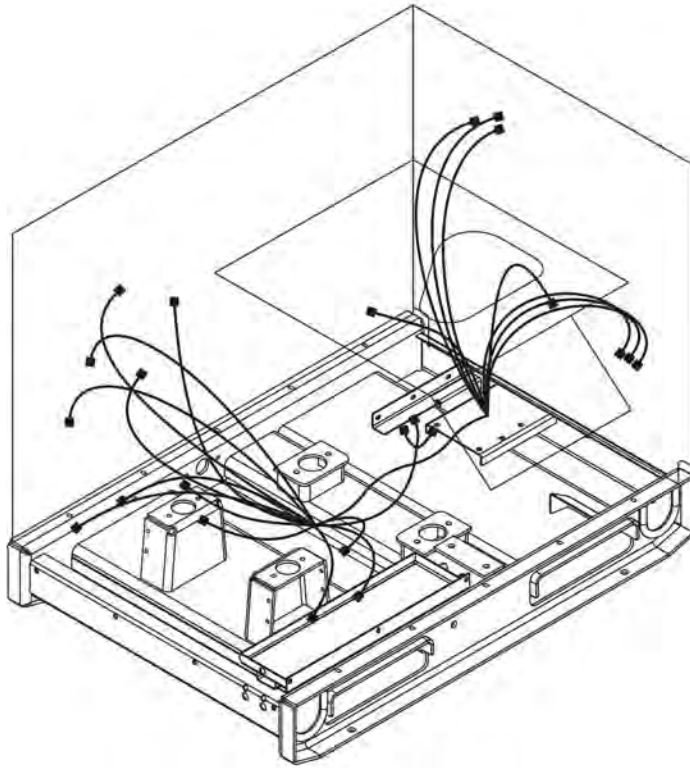
REMOVE/INSTALL ENGINE WIRING HARNESS – CONTINUED**Remove Engine Wiring Harness**

Figure 1. Engine Wiring Harness - Location.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate engine wiring harness (Figure 1).
3. Tag all connections consistently to show (to and from) proper identification of devices prior to disconnecting.

REMOVE/INSTALL ENGINE WIRING HARNESS – CONTINUED

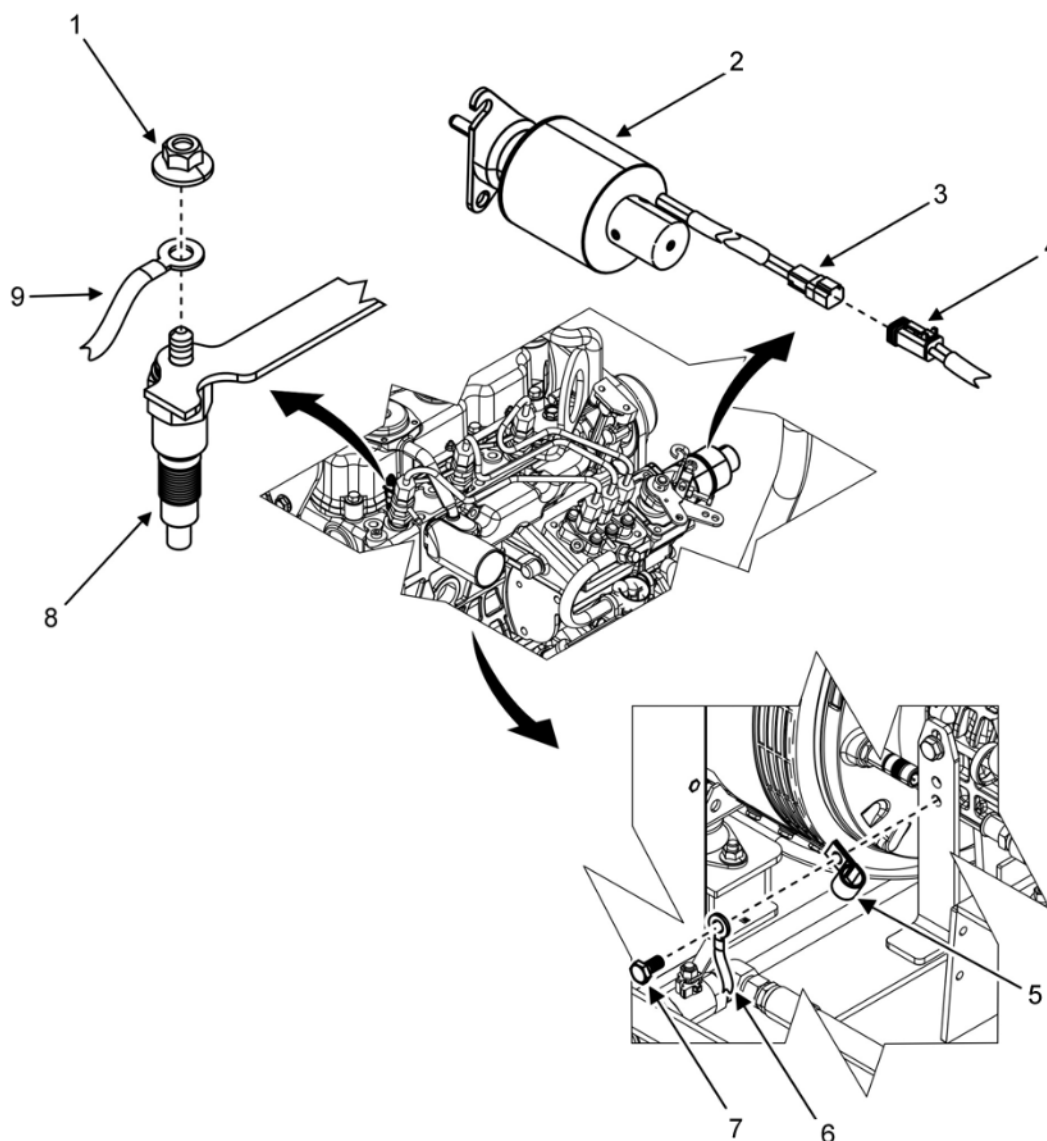


Figure 2. Right-Side Door - Upper View.

4. Remove nut (Figure 2, Item 1) that secures electrical lead (T5) (Figure 2, Item 9) to glow plug (Figure 2, Item 8) and remove lead (T5) (Figure 2, Item 9).
5. Disconnect electrical lead (P37) (Figure 2, Item 4) at pigtail (Figure 2, Item 3) of governor actuator (Figure 2, Item 2).
6. Remove bolt (Figure 2, Item 7), P37 drain wire (Figure 2, Item 6) and loop clamp (Figure 2, Item 5) from right-side of engine block.
7. Remove bolt (Figure 2, Item 7) and loop clamp (Figure 2, Item 5) from beneath starter (not shown) on left-side of engine. Allow loop clamp to remain on engine wiring harness.

REMOVE/INSTALL ENGINE WIRING HARNESS – CONTINUED

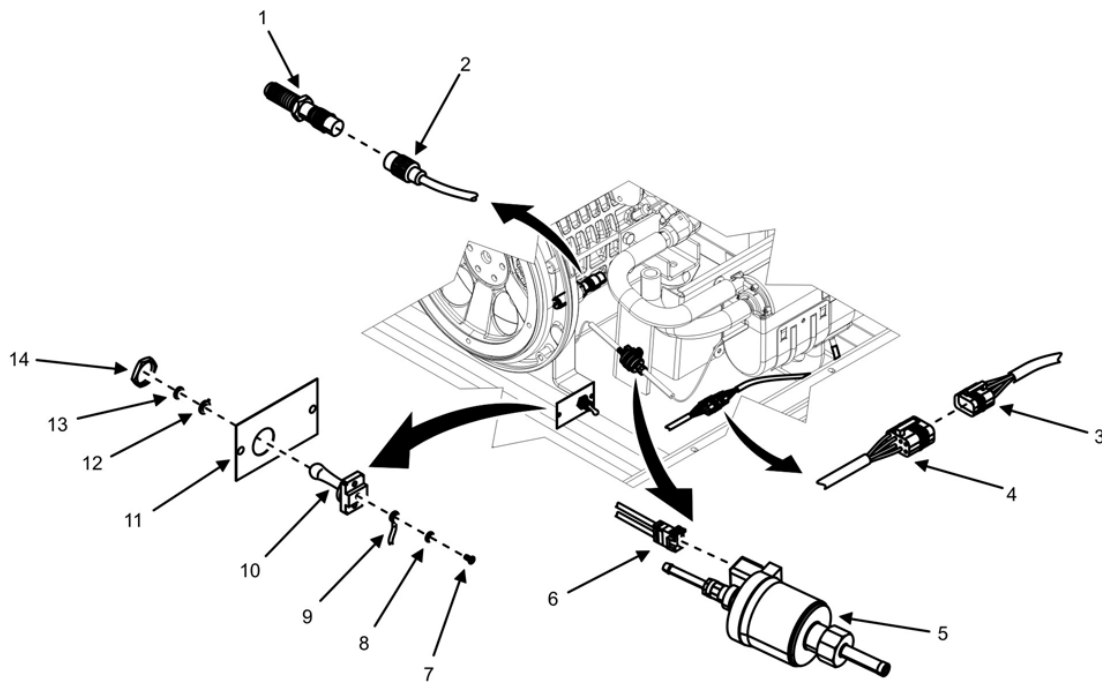


Figure 3. Right-Side Door - Lower View.

8. Remove nut (Figure 3, Item 14) and two washers (Figure 3, Items 13 and 12) that secure DEAD CRANK SWITCH (Figure 3, Item 10) to its mounting bracket (Figure 3, Item 11).
9. Remove DEAD CRANK SWITCH (Figure 3, Item 10) from mounting bracket (Figure 3, Item 11).
10. Remove three screws (Figure 3, Item 7) and three flat washers (Figure 3, Item 8) that secure three wires (S10-1, S10-2, and S10-3) (Figure 3, Item 9) at the rear of DEAD CRANK SWITCH (Figure 3, Item 10).
11. Remove three wires (S10-1, S10-2, and S10-3) (Figure 3, Item 9) from DEAD CRANK SWITCH (Figure 3, Item 10).
12. Disconnect electrical lead (P14) (Figure 3, Item 2) from engine speed sensor (Figure 3, Item 1).

NOTE

Steps 13 and 14 apply only to generator sets with winterization kit option installed.

13. Disconnect electrical lead (P20A) (Figure 3, Item 3) from winterization kit pigtail (Figure 3, Item 4).
14. Disconnect electrical lead (P21) (Figure 3, Item 6) from winterization kit fuel pump (Figure 3, Item 5) by depressing metallic clip on electrical lead (P21) (Figure 3, Item 6).
15. Locate two spare wiring harness electrical connectors (P75 and J20C) (not shown) on engine wiring harness near winterization kit fuel pump (Figure 3, Item 5).
16. Push all electrical leads removed in Steps 4 through 14 (except winterization kit fuel pump lead) under AC generator (not shown) to the left-side of the generator set.

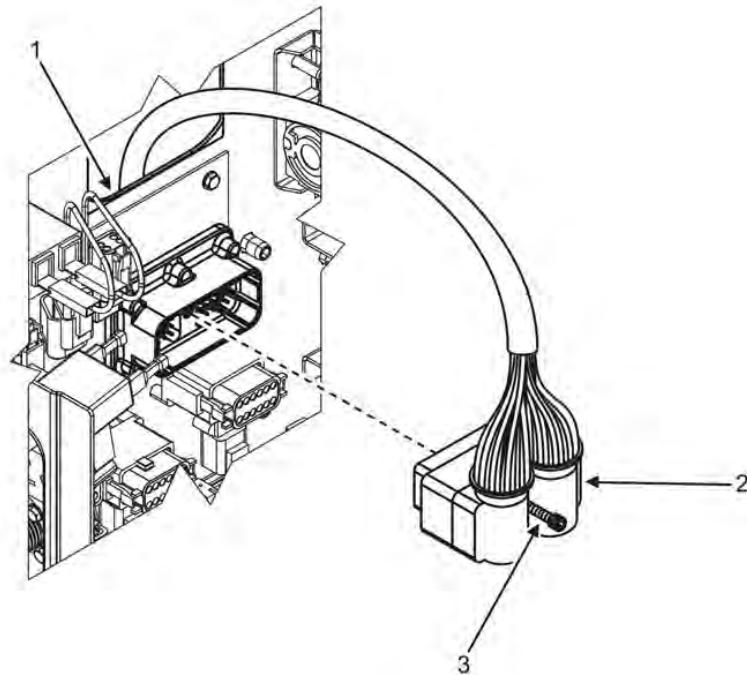
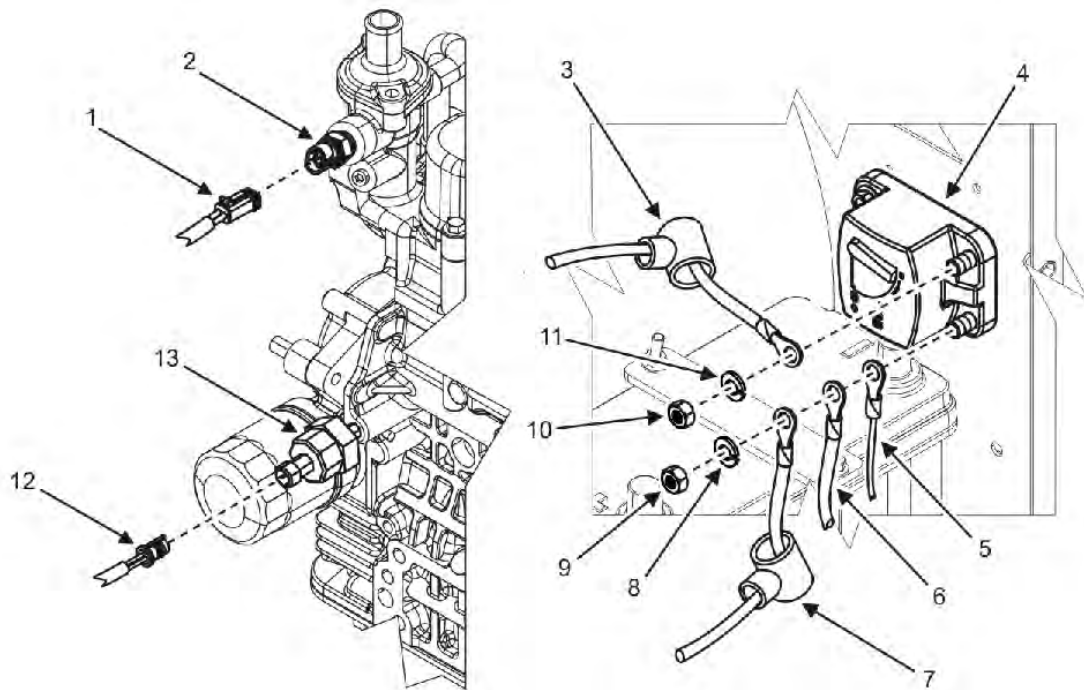
REMOVE/INSTALL ENGINE WIRING HARNESS – CONTINUED

Figure 4. Right-Side Rear - Output Box View.

17. Loosen screw (Figure 4, Item 3) that secures connector (P500) (Figure 4, Item 2) inside output box. Push connector (P500) (Figure 4, Item 2) through large slot (Figure 4, Item 1) in output box into rear of generator set.

REMOVE/INSTALL ENGINE WIRING HARNESS – CONTINUED

**Figure 5. Left-Side - Upper View.**

18. Disconnect electrical lead (P35) (Figure 5, Item 1) at coolant temperature sensor (Figure 5, Item 2).
19. Disconnect electrical lead (P40) (Figure 5, Item 12) at oil pressure sensor (Figure 5, Item 13).

NOTE

Steps 20 through 22 apply only to generator sets with winterization kit option installed.

20. Remove nut (Figure 5, Item 10), lockwasher (Figure 5, Item 11), and wire (Figure 5, Item 3) from main DC circuit breaker (Figure 5, Item 4).
21. Remove nut (Figure 5, Item 9), lockwasher (Figure 5, Item 8), and wires (Figure 5, Items 6 and 7) from main DC circuit breaker (Figure 5, Item 4).
22. Remove single white wire (CB201-LOAD) (Figure 5, Item 5) from main DC circuit breaker (Figure 5, Item 4).

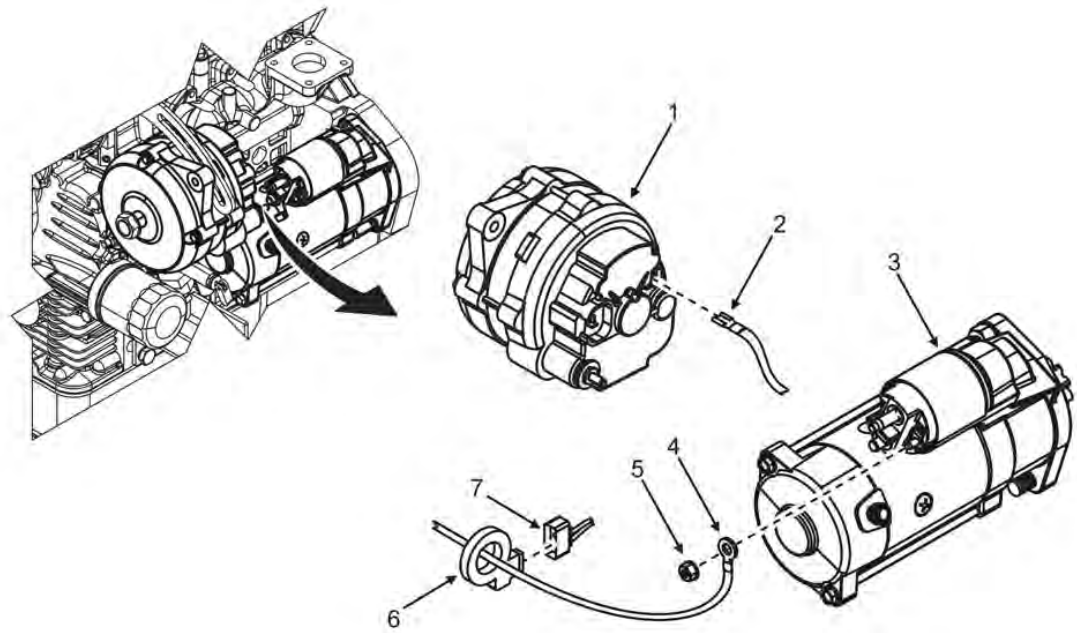
REMOVE/INSTALL ENGINE WIRING HARNESS – CONTINUED

Figure 6. Left-Side - Lower View.

23. Disconnect spade connector (P1) (Figure 6, Item 2) at rear of battery-charging alternator (Figure 6, Item 1).
24. Disconnect electrical lead (P5) (Figure 6, Item 7) at battery current sensor (Figure 6, Item 6).
25. Remove nut (Figure 6, Item 5) that secures wire (T107) (Figure 6, Item 4) to starter (Figure 6, Item 3).
26. Remove wire (T107) (Figure 6, Item 4) from starter (Figure 6, Item 3).
27. Inspect battery current sensor (Figure 6, Item 6) for damage. Remove battery current sensor (Figure 6, Item 6) and wire tie from wire (T107) (Figure 6, Item 4) and replace as required.

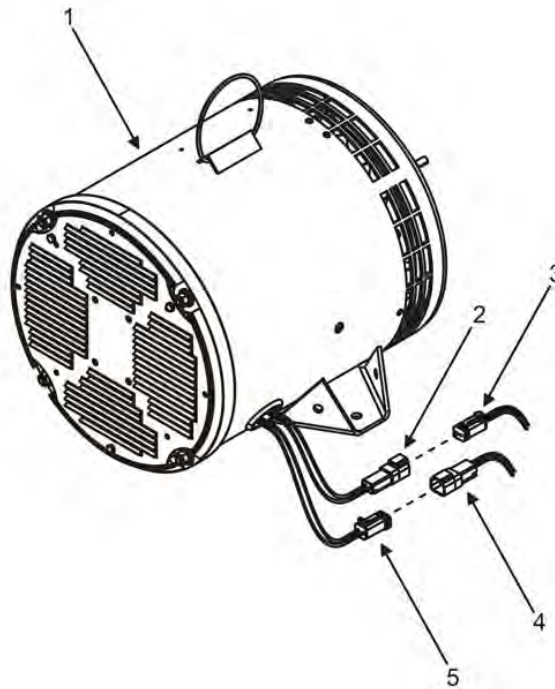
REMOVE/INSTALL ENGINE WIRING HARNESS – CONTINUED

Figure 7. Right-Side Rear - AC Generator.

28. Remove connectors (P85 and P90) (Figure 7, Items 3 and 4) from pigtails (Figure 7, Items 2 and 5) on AC generator (Figure 7, Item 1).

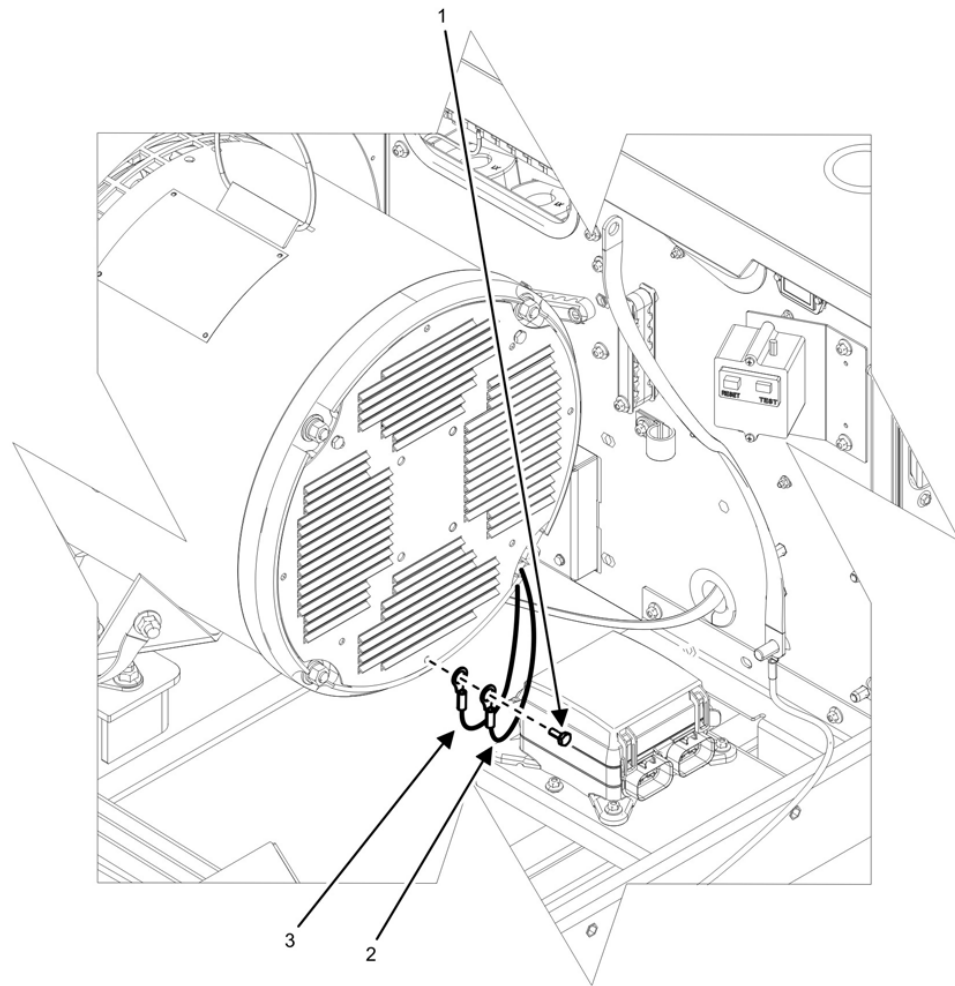
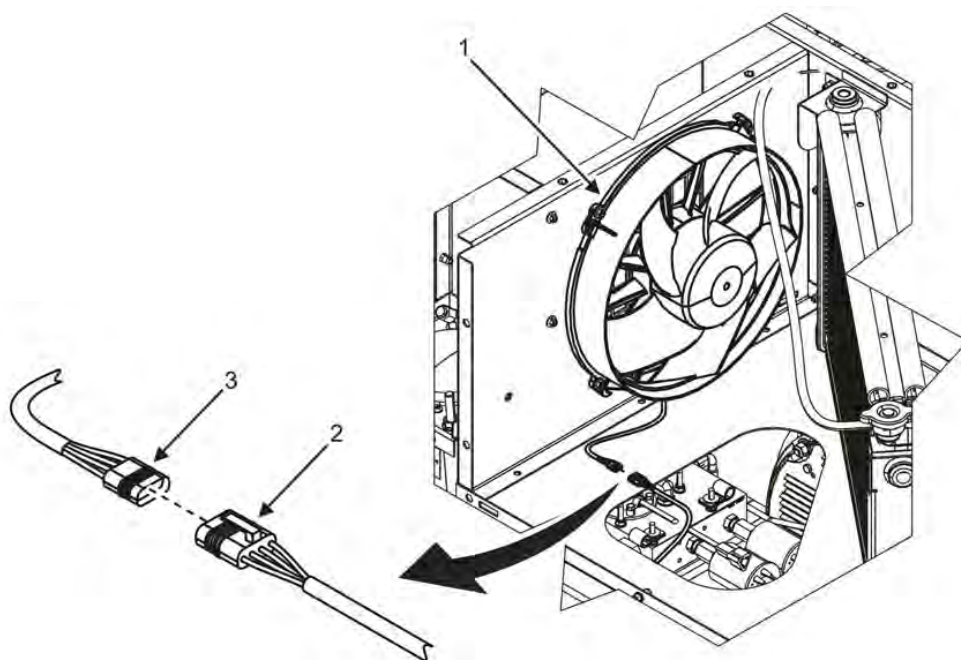
REMOVE/INSTALL ENGINE WIRING HARNESS – CONTINUED

Figure 8. Drain Wires - Output Box and AC Generator.

29. Remove bolt (Figure 8, Item 5) and two drain wires (Figure 8, Items 6 and 7) from rear of AC generator.

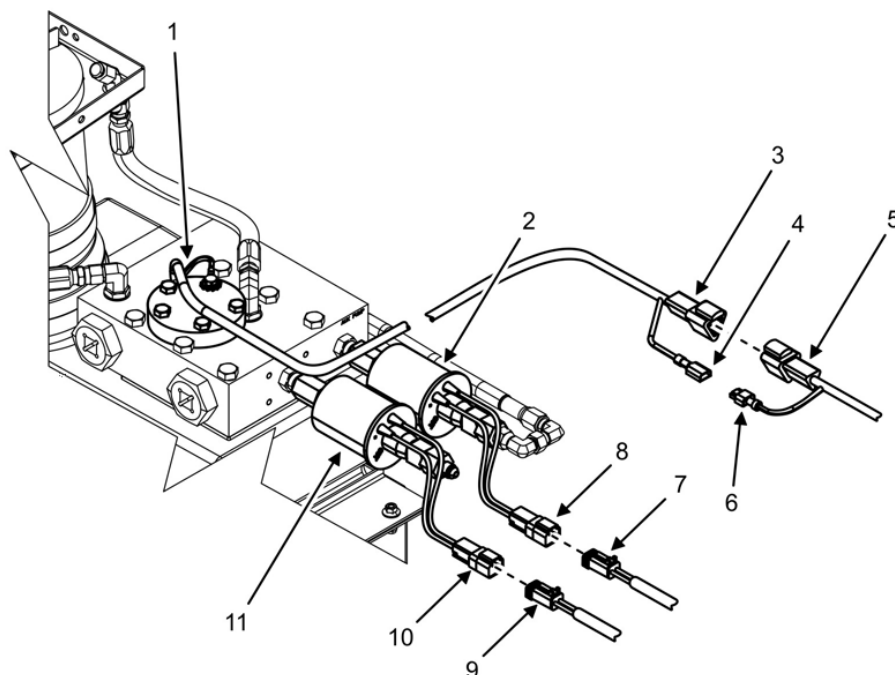
REMOVE/INSTALL ENGINE WIRING HARNESS – CONTINUED

30.

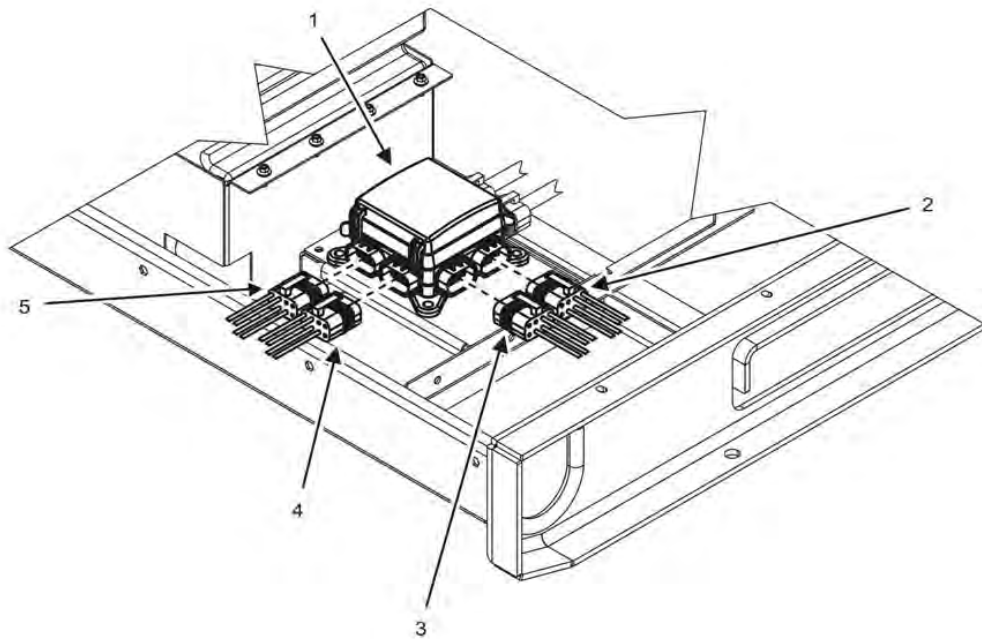
**Figure 9. Cooling Fan Connection.**

Remove wiring harness connector (P96) (Figure 9, Item 3) from pigtail (Figure 9, Item 2) on cooling fan (Figure 9, Item 1) and allow the connector (P96) (Figure 9, Item 3) to pass through the slot in radiator support panel into the lower rear of the generator set.

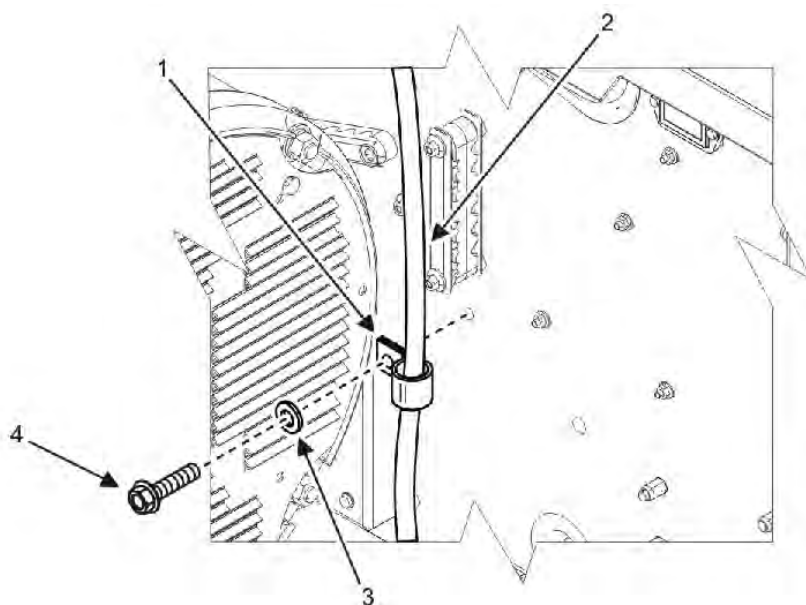
REMOVE/INSTALL ENGINE WIRING HARNESS – CONTINUED

**Figure 10. Rear Door - Fuel System.**

31. Remove connector (P60) (Figure 10, Item 7) from pigtail (Figure 10, Item 8) on auxiliary fuel pump (Figure 10, Item 2).
32. Remove connector (P65) (Figure 10, Item 9) from pigtail (Figure 10, Item 10) on main fuel pump (Figure 10, Item 11).
33. Remove connector (P70) (Figure 10, Item 5) from pigtail (Figure 10, Item 3) on fuel level sender (Figure 10, Item 1). Remove terminal connector (Figure 10, Item 6) from terminal connector (Figure 10, Item 4) on pigtail (Figure 10, Item 3) of fuel level sender (Figure 10, Item 1).

REMOVE/INSTALL ENGINE WIRING HARNESS – CONTINUED**Figure 11. Rear Door - Relay Panel.**

34. Remove connector (P5A) (Figure 11, Item 5) from relay panel (Figure 11, Item 1).
35. Remove connector (P5B) (Figure 11, Item 4) from relay panel (Figure 11, Item 1).
36. Remove connector (P5C) (Figure 11, Item 3) from relay panel (Figure 11, Item 1).
37. Remove connector (P5D) (Figure 11, Item 2) from relay panel (Figure 11, Item 1).

REMOVE/INSTALL ENGINE WIRING HARNESS – CONTINUED**Figure 12. Loop Clamps.****NOTE**

In addition to various electrical connectors, the engine wiring harness is attached to the engine in several places by loop clamps. The loop clamps must be removed from their mounting points before the engine wiring harness can be removed from the generator set.

All loop clamps are secured using a mounting screw mounted to a boss.

38. Locate remaining loop clamps (Figure 12, Item 1) securing engine wiring harness (Figure 12, Item 2) to the generator set.
39. Remove mounting screw (Figure 12, Item 4) and washer (as applicable) (Figure 12, Item 3) that secures each loop clamp (Figure 12, Item 1) to its mounting location on generator set. Leave loop clamps (Figure 12, Item 1) attached to engine wiring harness (Figure 12, Item 2).
40. Remove engine wiring harness (Figure 1) from unit skid through rear door being careful not to entangle electrical leads on unit components.
41. Remove loop clamps (Figure 12, Item 1) from engine wiring harness (Figure 1).

END OF TASK**Inspect Engine Wiring Harness**

1. If harness is to be reused, inspect engine wiring harness (Figure 1) for damaged connectors and sheathing.
2. Repair damaged electrical connectors (WP 0093, General Maintenance).
3. Replace damaged sheathing as required.

END OF TASK

REMOVE/INSTALL ENGINE WIRING HARNESS – CONTINUED**Install Engine Wiring Harness****CAUTION**

Use tags/markings applied to electrical components prior to removal as guides to installation. Leave tags/markings in place until all components have been installed and the equipment is operating properly.

1. Position engine wiring harness (Figure 1) to its approximate mounting location in unit skid, spreading branches of harness close to their points of installation.
2. Position loop clamps (Figure 12, Item 1) on engine wiring harness (Figure 1) at approximate mounting locations.
3. Secure loop clamp (Figure 12, Item 1) to each boss by installing mounting screw (Figure 12, Item 4), leaving loop clamp (Figure 12, Item 1) loose enough around engine wiring harness (Figure 12, Item 2) to allow engine wiring harness (Figure 12, Item 2) to slide through loop clamp (Figure 12, Item 1).
4. Install connector (P5D) (Figure 11, Item 2) to relay panel (Figure 11, Item 1).
5. Install connector (P5C) (Figure 11, Item 3) to relay panel (Figure 11, Item 1).
6. Install connector (P5B) (Figure 11, Item 4) to relay panel (Figure 11, Item 1).
7. Install connector (P5A) (Figure 11, Item 5) to relay panel (Figure 11, Item 1).
8. Install connector (P70) (Figure 10, Item 5) to pigtail (Figure 10, Item 3) of fuel level sender (Figure 10, Item 1). Install terminal connector (Figure 10, Item 6) to terminal connector (Figure 10, Item 4) on pigtail (Figure 10, Item 3) of fuel level sender (Figure 10, Item 1).
9. Install connector (P65) (Figure 10, Item 9) to pigtail (Figure 10, Item 10) of main fuel pump (Figure 10, Item 11).
10. Install connector (P60) (Figure 10, Item 7) to pigtail (Figure 10, Item 8) of auxiliary fuel pump (Figure 10, Item 2).
11. Pass wiring harness connector (P96) (Figure 9, Item 3) up through slot in radiator support panel into upper rear of generator set.
12. Install wiring harness connector (P96) (Figure 9, Item 3) to pigtail (Figure 9, Item 2) of cooling fan (Figure 9, Item 1).
13. Install two drain wires (Figure 8, Items 2 and 3) and bolt (Figure 8, Item 1) to rear of AC generator.
14. Push twin electrical connector (P500) (Figure 4, Item 2) through slot (Figure 4, Item 1) into output box.
15. Install two connectors (P85 and P90) (Figure 7, Items 3 and 4) to two pigtails (Figure 7, Items 2 and 5) of AC generator (Figure 7, Item 1).
16. Slide remaining portion of engine wiring harness (Figure 1) under AC generator (Figure 7, Item 1) and into left-side of generator set skid.
17. Install battery current sensor (Figure 6, Item 6) to wire (T107) (Figure 6, Item 4) and secure with wire tie as required.
18. Install wire (T107) (Figure 6, Item 4) to right-side solenoid stud of starter (Figure 6, Item 3) and secure by installing nut (Figure 6, Item 5).
19. Connect electrical lead (P5) (Figure 6, Item 7) to battery current sensor (Figure 6, Item 6).
20. Install spade connector (P1) (Figure 6, Item 2) to rear of battery-charging alternator (Figure 6, Item 1).

NOTE

Steps 21 through 23 apply only to generator sets with winterization kit option installed.

21. Install single white wire (CB201-LOAD) (Figure 5, Item 5) to main DC circuit breaker (Figure 5, Item 4).

REMOVE/INSTALL ENGINE WIRING HARNESS – CONTINUED

22. Install wires (Figure 5, Items 6 and 7) to main DC circuit breaker (Figure 5, Item 4) with lockwasher (Figure 5, Item 8) and nut (Figure 5, Item 9).
23. Install remaining wire (Figure 5, Item 3), lockwasher (Figure 5, Item 11), and nut (Figure 5, Item 10) to main DC circuit breaker (Figure 5, Item 4).
24. Connect electrical lead (P40) (Figure 5, Item 12) to oil pressure sensor (Figure 5, Item 13).
25. Connect electrical lead (P35) (Figure 5, Item 1) to coolant temperature sensor (Figure 5, Item 2).
26. Connect twin electrical connector (P500) (Figure 4, Item 2) to its mating connector in output box and secure by installing screw (Figure 4, Item 3).
27. Position winterization kit fuel pump lead (P21) (Figure 3, Item 6) under flywheel to its mounting location at winterization kit fuel pump (Figure 3, Item 5).

NOTE

Step 28 applies only to generator sets with winterization kit option installed.

28. Connect winterization kit fuel pump lead (P21) (Figure 3, Item 6) to winterization kit fuel pump (Figure 3, Item 5).
29. Allow two spare electrical connectors (P75 and J20C) (not shown) to hang free near winterization kit fuel pump (Figure 3, Item 5).

NOTE

Step 30 applies only to generator sets with winterization kit option installed.

30. Connect winterization kit electrical lead (P20A) (Figure 3, Item 3) to winterization kit pigtail (Figure 3, Item 4).
31. Connect engine speed sensor electrical lead (P14) (Figure 3, Item 2) to engine speed sensor (Figure 3, Item 1).
32. Position three wires (S10-1, S10-2, and S10-3) (Figure 3, Item 9) to their mounting locations on rear of DEAD CRANK SWITCH (Figure 3, Item 10) and secure by installing three flat washers (Figure 3, Item 8) and three screws (Figure 3, Item 7).
33. Position DEAD CRANK SWITCH (Figure 3, Item 10) to its mounting location on bracket (Figure 3, Item 11) and secure by installing nut (Figure 3, Item 14) and two washers (Figure 3, Items 12 and 13).
34. Install bolt (Figure 2, Item 7), P37 drain wire (Figure 2, Item 6), and loop clamp (Figure 2, Item 5) to engine block. Torque bolt (Figure 2, Item 7) to 35-42 ft•lbs (48-57 N•m).
35. Connect governor actuator electrical lead (P37) (Figure 2, Item 4) to pigtail (Figure 2, Item 3) of governor actuator (Figure 2, Item 2).
36. Position glow plug electrical wire (T5) (Figure 2, Item 9) to its mounting position on glow plug (Figure 2, Item 8) and secure by installing nut (Figure 2, Item 1).
37. Install all remaining mounting screws (Figure 12, Item 4) and washers (Figure 12, Item 3) on all remaining loop clamps (Figure 12, Item 1) to mounting location to secure engine wiring harness (Figure 12, Item 2).
38. Install rear body panel (WP 0030, Remove/Install Rear Body Panel).
39. Install DCS (WP 0017, Remove/Install DCS).
40. Install right-side body panel (WP 0032, Remove/Install Right-Side Body Panel).
41. Install left-side body panel (WP 0031, Remove/Install Left-Side Body Panel).
42. Install top body panel (WP 0028, Remove/Install Top Body Panel).
43. Install right-side battery and negative ground cable to right-side battery (WP 0036, Remove/Install Batteries).

REMOVE/INSTALL ENGINE WIRING HARNESS – CONTINUED

44. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
45. Start engine and check for proper operation. Bring coolant to normal operating temperature and then apply a 100% rated load for 30 min (TM 9-6115-749-10).
46. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**REMOVE/INSTALL POWER WIRING HARNESS**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Materials/Parts

Insulation sleeving (WP 0154, Item 7)
Wiring harness, power (WP 0154, Item 1)
Grease, electrically conductive (WP 0163, Table 1, Item 20)
Tag, marker (WP 0163, Table 1, Item 35)

Personnel Required

91D (1)

Personnel Required - cont'd

Assistant (1)

References

WP 0093, General Maintenance

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Batteries removed (WP 0036, Remove/Install Batteries)

REMOVE/INSTALL POWER WIRING HARNESS**Remove Power Wiring Harness**

1. Ensure equipment conditions are met in order presented in initial setup.
2. Open left-side door to expose exhaust side of engine.

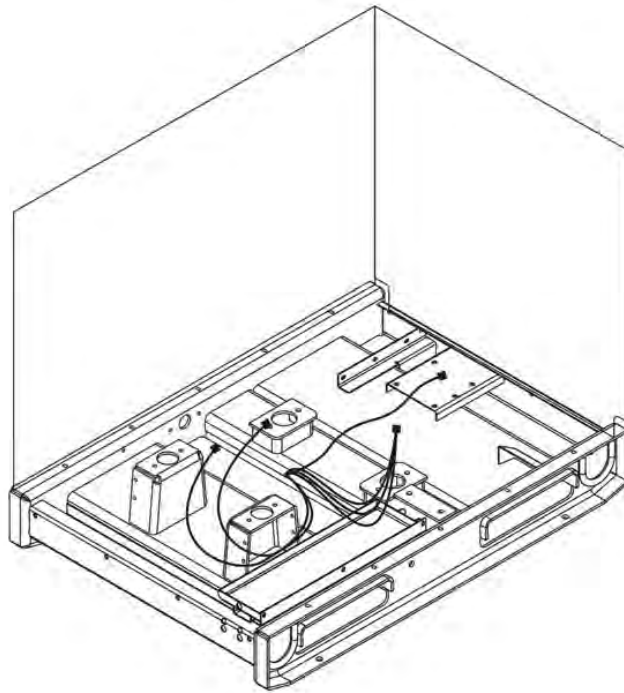
REMOVE/INSTALL POWER WIRING HARNESS – CONTINUED

Figure 1. Power Wiring Harness - Location.

3. Locate power wiring harness (Figure 1).

REMOVE/INSTALL POWER WIRING HARNESS – CONTINUED

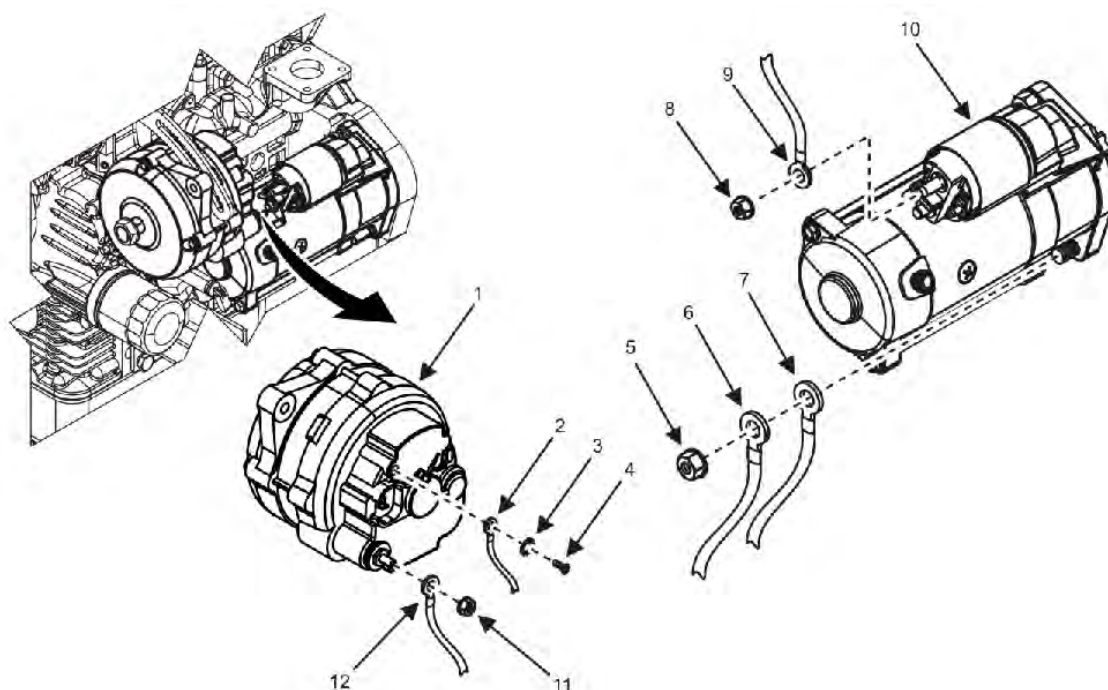


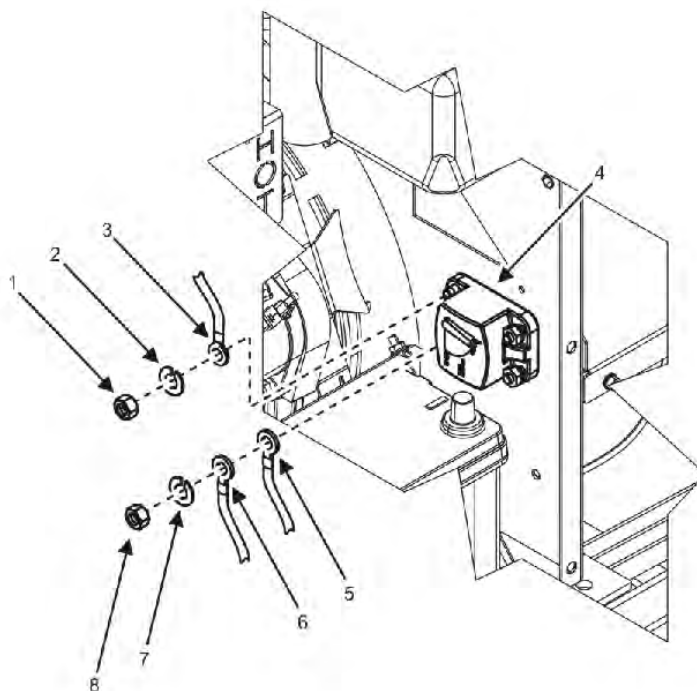
Figure 2. Left-Side Door View.

NOTE

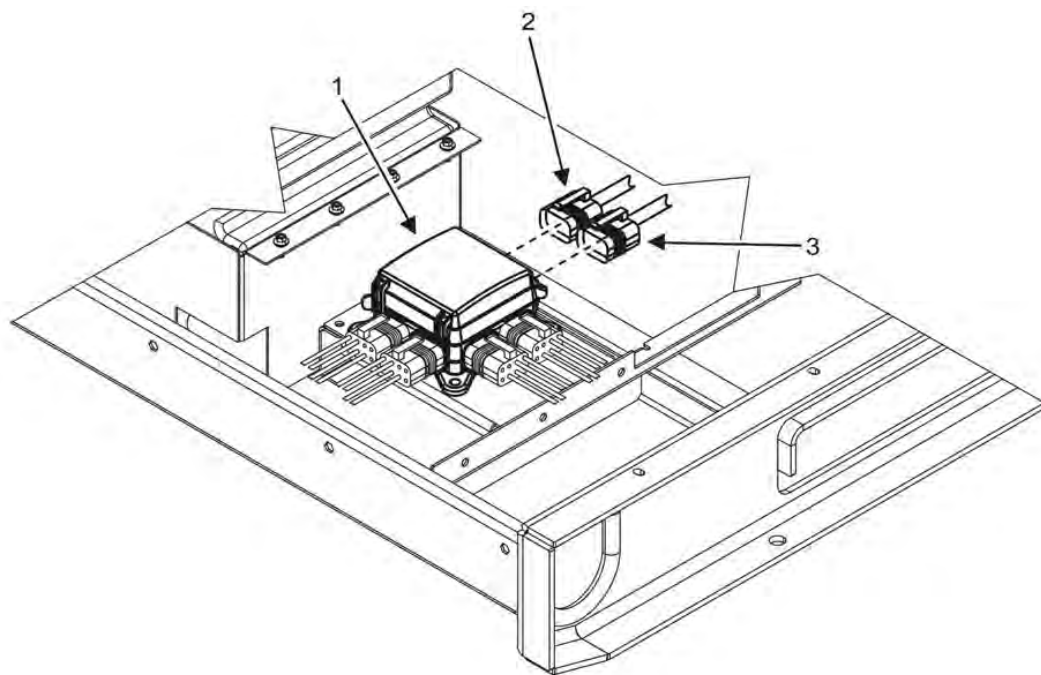
Tag/mark all electrical wires prior to removal. Tags will serve as a guide during installation.

4. Reposition boot on wire (G2-GND) (Figure 2, Item 12) at stud of battery-charging alternator (Figure 2, Item 1) to expose nut (Figure 2, Item 11).
5. Remove nut (Figure 2, Item 11) at stud of battery-charging alternator (Figure 2, Item 1) and remove wire (G2-GND) (Figure 2, Item 12).
6. Remove screw (Figure 2, Item 4) and external tooth washer (Figure 2, Item 3) from rear of battery-charging alternator (Figure 2, Item 1) and remove wire (G2-B) (Figure 2, Item 2). Discard external tooth washer (Figure 2, Item 3).
7. Reposition boot on wire (L4-1) (Figure 2, Item 9) at upper solenoid stud of starter (Figure 2, Item 10) to expose nut (Figure 2, Item 8).
8. Remove nut (Figure 2, Item 8) at upper solenoid stud of starter (Figure 2, Item 10) and remove wire (L4-1) (Figure 2, Item 9).
9. Reposition boot on wire (B1-(-)) (Figure 2, Item 6) at lower mounting stud of starter (Figure 2, Item 10) to expose nut (Figure 2, Item 5).
10. Remove nut (Figure 2, Item 5) at lower mounting stud of starter (Figure 2, Item 10) and remove two wires (B1-(-)) (Figure 2, Items 6 and 7).

REMOVE/INSTALL POWER WIRING HARNESS – CONTINUED

**Figure 3. Main DC Circuit Breaker.**

11. Reposition boot on wire (CB 201-Line) (Figure 3, Item 3) at upper terminal (line) of main DC circuit breaker (Figure 3, Item 4) to expose nut (Figure 3, Item 1).
12. Remove nut (Figure 3, Item 1) and lockwasher (Figure 3, Item 2) at upper terminal (line) of main DC circuit breaker (Figure 3, Item 4) and remove wire (CB 201-Line) (Figure 3, Item 3). Discard lockwasher (Figure 3, Item 2).
13. Reposition boot on wire (CB 201-Load) (Figure 3, Item 6) at lower terminal (load) of main DC circuit breaker (Figure 3, Item 4) to expose nut (Figure 3, Item 8).
14. Remove nut (Figure 3, Item 8) and lockwasher (Figure 3, Item 7) at lower terminal (load) of main DC circuit breaker (Figure 3, Item 4) and remove two wires (CB 201-Load) (Figure 3, Items 5 and 6). Discard lockwasher (Figure 3, Item 7).
15. Open rear door.

REMOVE/INSTALL POWER WIRING HARNESS – CONTINUED**Figure 4. Relay Panel Connectors.**

16. Remove connector (P10) (Figure 4, Item 2) from relay panel (Figure 4, Item 1).
17. Remove connector (P11) (Figure 4, Item 3) from relay panel (Figure 4, Item 1).
18. Remove power wiring harness (Figure 1) from unit skid, being careful not to entangle harness leads on unit components.

END OF TASK**Inspect Power Wiring Harness**

1. If harness is to be reused, inspect power wiring harness (Figure 1) for damaged connectors and sheathing.
2. Repair damaged electrical connectors (WP 0093, General Maintenance).
3. Replace damaged sheathing as required.

END OF TASK**Install Power Wiring Harness**

1. Position power wiring harness (Figure 1) to its approximate mounting location in unit skid, spreading branches of harness close to their points of installation.
2. Move to rear door of generator set.

NOTE

Tags/markings applied to electrical wires during removal should remain in place until all components are installed and equipment is operating properly.

3. Install connector (P11) (Figure 4, Item 3) to relay panel (Figure 4, Item 1).

REMOVE/INSTALL POWER WIRING HARNESS – CONTINUED

4. Install connector (P10) (Figure 4, Item 2) to relay panel (Figure 4, Item 1).
5. Close rear door.
6. Move to left-side of generator set.
7. Position wire (CB 201-Line) (Figure 3, Item 3) to upper terminal of main DC circuit breaker (Figure 3, Item 4) and secure by installing new lockwasher (Figure 3, Item 2) and nut (Figure 3, Item 1).
8. Reposition boot on wire (CB 201-Line) (Figure 3, Item 3) to cover nut (Figure 3, Item 1).
9. Position two wires (CB 201-Load) (Figure 3, Items 5 and 6) to lower terminal of main DC circuit breaker (Figure 3, Item 4) and secure by installing new lockwasher (Figure 3, Item 7) and nut (Figure 3, Item 8).
10. Reposition boot on wire (CB 201-Load) (Figure 3, Item 6) to cover nut (Figure 3, Item 8).
11. Install two wires (B1-(-)) (Figure 2, Items 6 and 7) to lower mounting stud of starter (Figure 2, Item 10) and secure by installing nut (Figure 2, Item 5).
12. Reposition boot on wire (B1-(-)) (Figure 2, Item 6) to cover nut (Figure 2, Item 5) on lower mounting stud of starter (Figure 2, Item 10).
13. Install wire (L4-1) (Figure 2, Item 9) to upper solenoid stud of starter (Figure 2, Item 10) and secure by installing nut (Figure 3, Item 8).
14. Reposition boot on wire (L4-1) (Figure 2, Item 9) to cover nut (Figure 2, Item 8) on upper solenoid stud of starter (Figure 2, Item 10).
15. Install wire (G2-B) (Figure 2, Item 2) to rear of battery-charging alternator (Figure 2, Item 1) and secure by installing new external tooth washer (Figure 2, Item 3) and screw (Figure 2, Item 4).
16. Install wire (G2-GND) (Figure 2, Item 12) to stud of battery-charging alternator (Figure 2, Item 1) and secure by installing nut (Figure 2, Item 11).
17. Reposition boot on wire (G2-GND) (Figure 2, Item 12) to cover nut (Figure 2, Item 11) on stud of battery-charging alternator (Figure 2, Item 1).
18. Install batteries (WP 0036, Remove/Install Batteries).
19. Close left-side door.
20. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
21. Start engine and check for proper operation (TM 9-6115-749-10).
22. Repair as required.
23. Remove all temporary identification tags applied to electrical components.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
REMOVE/INSTALL RELAY PANEL

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
Wrench, Torque, Dial, 3/8 in Drive, 300 in•lb (WP 0162, Table 2, Item 43)

Personnel Required

91D (1)

References

WP 0093, General Maintenance

Materials/Parts

Circuit breaker (5) (WP 0101, Item 3)
Circuit breaker (1) (WP 0101, Item 4)
Circuit breaker (2) (WP 0101, Item 5)
Panel, relay (WP 0101, Item 1)
Relay (8) (WP 0101, Item 2)
Cleaning compound, solvent (WP 0163, Table 1, Item 10)
Grease, electrically conductive (WP 0163, Table 1, Item 20)
Rag, wiping (WP 0163, Table 1, Item 31)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)

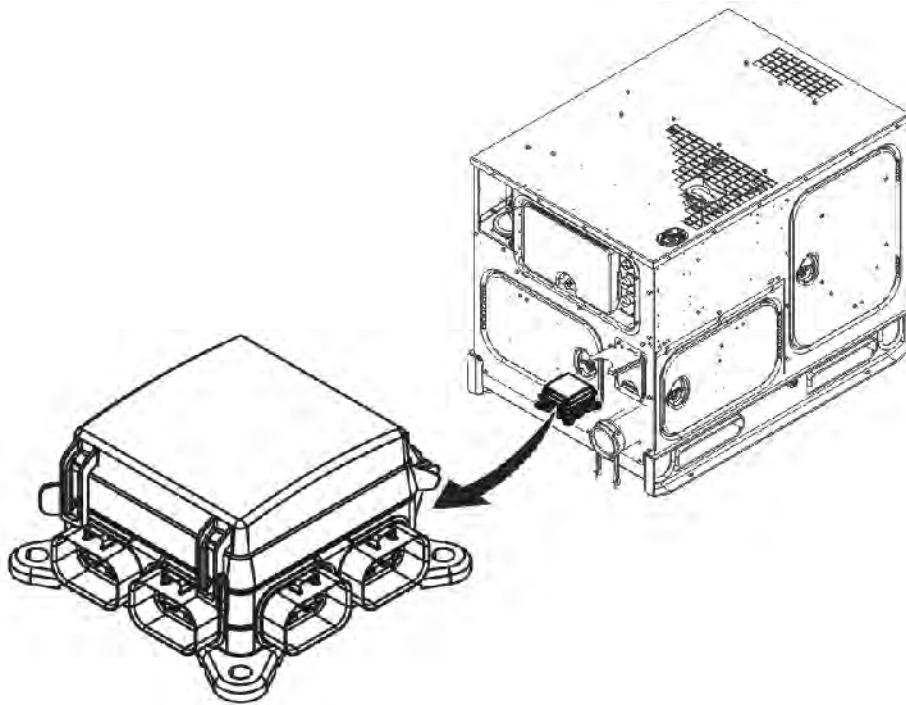
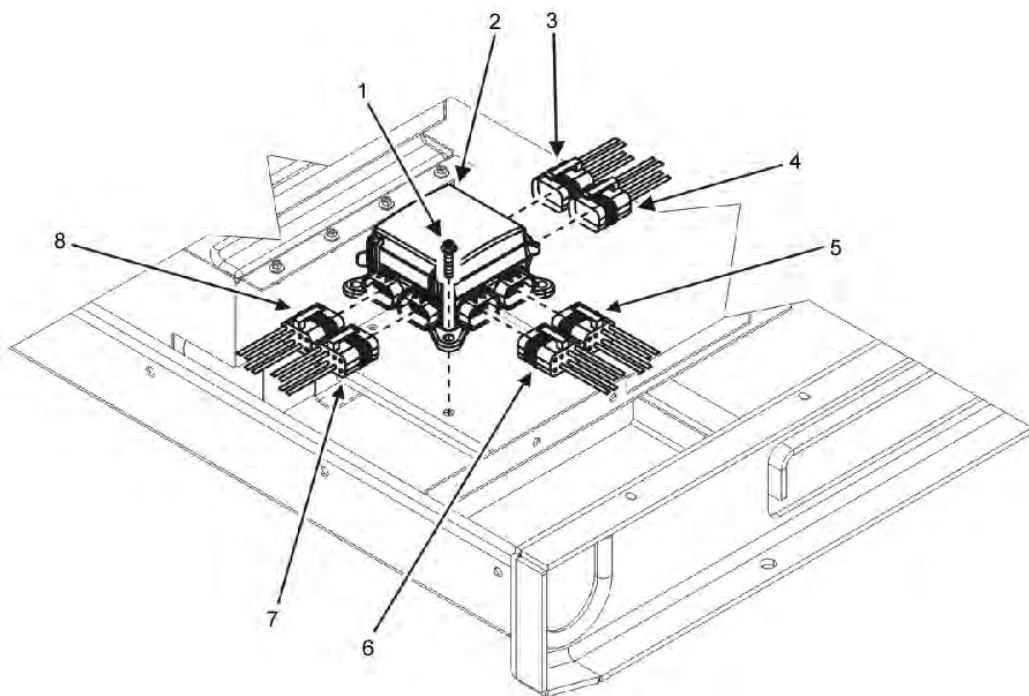
REMOVE/INSTALL RELAY PANEL**Remove Relay Panel**

Figure 1. Relay Panel - Location.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Open rear door and locate relay panel (Figure 1).

REMOVE/INSTALL RELAY PANEL – CONTINUED**Figure 2. Relay Panel - Removal.****NOTE**

The six electrical connectors attached to relay panel are all uniquely keyed and can only be installed in the proper locations. Tag/mark all electrical connectors for guide at installation.

3. Remove six electrical connectors (Figure 2, Items 3 through 8) from relay panel (Figure 2, Item 2).
4. Remove four flare head screws (Figure 2, Item 1) that secure relay panel (Figure 2, Item 2) to generator set skid.
5. Remove relay panel (Figure 2, Item 2) from generator set.

END OF TASK**Inspect Relay Panel**

1. Inspect all relay panel electrical connectors (Figure 2, Items 3 through 8) for signs of obvious damage.
2. Repair damaged electrical connectors (WP 0093, General Maintenance).
3. Inspect relay panel (Figure 2, Item 2) for signs of obvious damage.
4. Replace damaged relay panel (Figure 2, Item 2).

END OF TASK

REMOVE/INSTALL RELAY PANEL – CONTINUED**Install Relay Panel****WARNING**

Compound cleaning solvent is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection is required. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply may cause injury or death to personnel.

1. Clean dirt and debris from relay panel mounting location in generator set skid using compound cleaning fluid and wiping rags.
2. Position relay panel (Figure 2, Item 2) to its mounting position on generator set skid and secure by installing four flare head screws (Figure 2, Item 1).
3. Torque four flare head screws (Figure 2, Item 1) to 44-53 in•lb (5.0-6.0 N•m).
4. Apply electrically conductive grease to the six wiring harness connectors (Figure 2, Items 3 through 8).

NOTE

Leave all identification tags/markings in place until task is completed and generator set is fully operational.

5. Install six wiring harness connectors (Figure 2, Items 3 through 8) to relay panel using tags/markings applied at removal as a guide.
6. Close rear door.
7. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
8. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
9. Start engine and check for proper operation. Bring coolant to normal operating temperature and then apply a 100% rated load for 30 min (TM 9-6115-749-10).
10. Repair as required.

END OF TASK

REMOVE/INSTALL RELAY PANEL – CONTINUED

Service Relay Panel

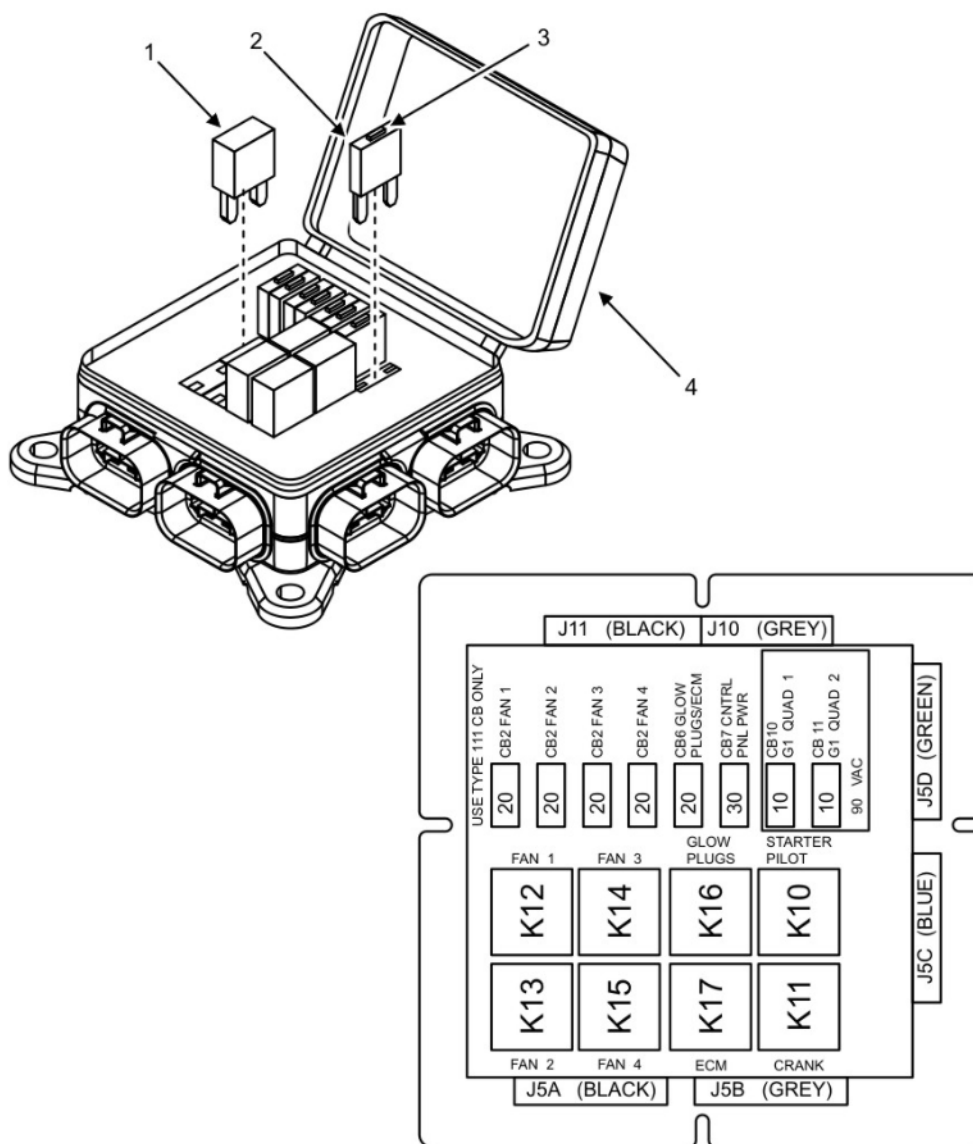


Figure 3. Relay Panel - Internal Layout.

CAUTION

When removing a circuit breaker (Figure 3, Item 2) or relay (Figure 3, Item 1) from the relay panel (Figure 2, Item 2), be careful not to tilt the circuit breaker or relay far enough to damage the contact pins. Failure to comply may cause damage to equipment.

NOTE

Service of the relay panel is accomplished by resetting or replacing a circuit breaker (Figure 3, Item 2) or by replacing a relay (Figure 3, Item 1).

REMOVE/INSTALL RELAY PANEL – CONTINUED

The relay panel (Figure 2, Item 2) has the capacity to house eight circuit breakers (Figure 3, Item 2) and eight relays (Figure 3, Item 1). The number of circuit breakers (Figure 3, Item 2) or relays (Figure 3, Item 1) present in the relay panel (Figure 2, Item 2) is determined by the configuration of individual generator sets. A legend on the inside of the relay panel cover (Figure 3) identifies each individual relay and circuit breaker. Wiring diagrams provided in the Rear Matter of this manual also identify the circuits protected by each circuit breaker (Figure 3, Item 2) or relay (Figure 3, Item 1).

An overload or short circuit in an electrical circuit may cause a circuit breaker (Figure 3, Item 2) to trip or fail completely. Circuit breakers (Figure 3, Item 2) may be reset or replaced as required. An overloaded electrical circuit may also cause failure of the relay (Figure 3, Item 1) in that circuit. Failed relays (Figure 3, Item 1) must be replaced.

Basic electrical troubleshooting procedures will enable the technician to trace an electrical circuit to a failed circuit breaker (Figure 3, Item 2) or relay (Figure 3, Item 1).

1. Ensure equipment conditions are met in order presented in initial setup.
2. Open rear door and locate relay panel (Figure 3, Item 4).
3. Open relay panel (Figure 3, Item 4) cover.
4. Reset tripped circuit breaker (Figure 3, Item 2):
 - a. Open relay panel (Figure 3, Item 4) cover.

NOTE

A circuit breaker that has been tripped due to a short in the corresponding electrical circuit will be identified by an extended colored plastic indicator (Figure 3, Item 3) on the circuit breaker.

Technicians may only reset a circuit breaker (Figure 3, Item 2) once after it has tripped. If the circuit breaker trips a second time, it must be replaced.

- b. Check circuit breakers (Figure 3, Item 2) for a tripped-condition.
 - c. Press the extended colored plastic indicator (Figure 3, Item 3) to return it to the set position.
 - (1) Continue with generator set operation if circuit breaker (Figure 3, Item 2) remains in the set position.
 - (2) Troubleshoot electrical circuit to determine cause if circuit breaker (Figure 3, Item 2) will not remain in set position.
 - d. Close relay panel (Figure 3, Item 4) cover.
5. Replace a failed circuit breaker (Figure 3, Item 2):
 - a. Open relay panel (Figure 3, Item 4) cover.

CAUTION

Removing the circuit breaker by tilting it at more than a slight angle may damage circuit breaker contact pins and/or relay panel socket. Failure to comply may cause damage to equipment.

- b. Pull failed circuit breaker (Figure 3, Item 2) from relay panel (Figure 3, Item 4) by tilting the circuit breaker slightly.

REMOVE/INSTALL RELAY PANEL – CONTINUED**CAUTION**

Always replace a failed circuit breaker (Figure 3, Item 2) with one of the same value. Replacing a circuit breaker (Figure 3, Item 2) with one of a greater value may result in damage to equipment. Failure to comply may cause damage to equipment.

- c. Insert new circuit breaker (Figure 3, Item 2) into relay panel (Figure 3, Item 4) in the same slot that housed the failed circuit breaker (Figure 3, Item 2).
6. Replace a failed relay (Figure 3, Item 1):
 - a. Pull failed relay (Figure 3, Item 1) from relay panel (Figure 3, Item 4) by tilting the circuit breaker slightly.
 - b. Insert new relay (Figure 3, Item 1) into relay panel (Figure 3, Item 4) in the same slot that housed the failed relay (Figure 3, Item 1).

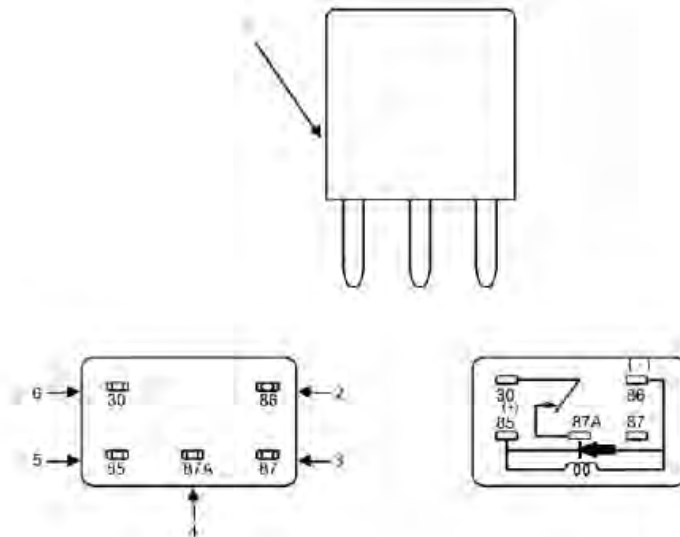


Figure 4. Test Relay.

7. Test a relay (Figure 4, Item 1):
 - a. Hold relay (Figure 4, Item 1) close to ear and shake it vigorously. Replace relay (Figure 4, Item 1) if the internals noticeably rattle.
 - b. Test relay (Figure 4, Item 1) for ohms and continuity:
 - (1) Set multimeter to read either ohms or continuity.
 - (2) Place multimeter probes on relay pins as shown in Table 1.
 - (3) Compare multimeter reading with values in Table 1.
 - (4) Retain relay (Figure 4, Item 1) for reuse if multimeter reading matches value in "Good" column.
 - (5) Replace relay (Figure 4, Item 1) if multimeter reading matches value in "Bad" column.

REMOVE/INSTALL RELAY PANEL – CONTINUED**Table 1. Relay Test for Ohms and Continuity.**

TEST ACROSS PINS	OHMS - GOOD	OHMS - BAD
85 to 86 (Figure 4, Items 5 to 2)	435-531 Ω	Outside range of 435-531 Ω
30 to 87A (Figure 4, Items 6 to 4)	0 Ω short circuit	Infinity (∞) Ω Open circuit
85 to 87 (Figure 4, Items 6 to 3)	Infinity (∞) Ω Open circuit	0 Ω short circuit
85 to 87, 85 to 87A, and 85 to 30 (Figure 4, Items 5 to 3, 4, and 6)	Infinity (∞) Ω Open circuit	0 Ω short circuit
86 to 87, 86 to 87A, and 86 to 30 (Figure 4, Items 2 to 3, 4, and 6)	Infinity (∞) Ω Open circuit	0 Ω short circuit

NOTE

Voltage required to operate relay is 14.4 to 31.9 VDC applied. Check voltage supply source using a multimeter to verify test voltage is within specification.

- c. Apply 24VDC across pins 85 and 86 (Figure 4) and listen for an audible "click".
 - (1) Retain relay (Figure 4, Item 1) for reuse if "click" is heard, indicating connection between pins 85 and 87 (Figure 4) is closed.
 - (2) Replace relay (Figure 4, Item 1) if no "click" is heard, indicating connection between pins 85 and 87 (Figure 4) remains open.
8. Close relay panel (Figure 3, Item 4) cover.
9. Close rear door.
10. Install negative ground cable from right-hand battery (WP 0036, Remove/Install Batteries).
11. Close left-side door.
12. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
13. Start engine and check for proper operation. Bring coolant to normal operating temperature and then apply a 100% rated load for 30 min (TM 9-6115-749-10).
14. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

TEST ENGINE COMPRESSION

INITIAL SETUP:**Test Equipment**

Adapter, Compression Test (WP 0162, Table 2, Item 1)
 Tester, Cylinder Compression (WP 0162, Table 2, Item 29)

Personnel Required

91D (1)

Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

References

WP 0039, Service Fuel System
 WP 0064, Remove/Install 50/60 Hz Engine Assembly
 WP 0065, Remove/Install 400 Hz Engine Assembly
 WP 0068, Remove/Install Glow Plugs
 WP 0082, Remove/Install Valve Cover

Materials/Parts

Gasket (3) (WP 0127, Item 10)
 Seal, plain encased (3) (WP 0127, Item 11)
 Brush, wire, scratch, brass (WP 0163, Table 1, Item 7)
 Cap set, protective (WP 0163, Table 1, Item 8)
 Cleaning compound, solvent (WP 0163, Table 1, Item 10)
 Compound, antiseize (WP 0163, Table 1, Item 13)
 Compound, sealing (WP 0163, Table 1, Item 15)
 Grease, electrically conductive (WP 0163, Table 1, Item 20)
 Rag, wiping (WP 0163, Table 1, Item 31)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool
 Intake and exhaust valves adjusted to proper specification (WP 0083, Check/Adjust Engine Valves)

TEST ENGINE COMPRESSION**WARNING**

Starting engine when unit is partially disassembled is dangerous. Run engine in this condition only as long as required to test operation. Keep away from unprotected moving engine parts during operation. Failure to comply may cause injury or death to personnel.

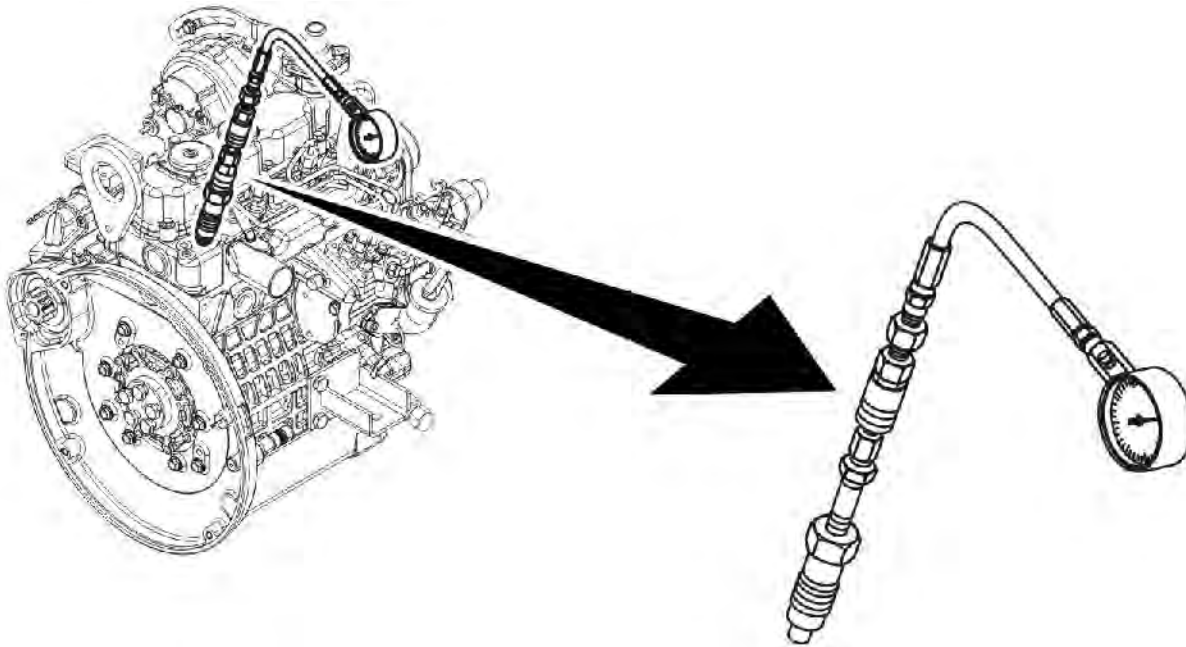
TEST ENGINE COMPRESSION – CONTINUED**Test Engine Compression**

Figure 1. Compression Test in Fuel Injector Opening - Location.

WARNING

Wear heat resistant gloves and avoid contacting hot metal surfaces with hands and exposed skin after components have been heated. Wear additional protective clothing as required. Failure to comply may cause injury or death to personnel.

CAUTION

Intake and exhaust valves must be adjusted to specification prior to testing engine compression (WP 0083, Check and Adjust Engine Valves). Batteries must be fully charged prior to testing engine compression. Failure to comply will cause damage to equipment.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
3. Start engine and run until it reaches normal operating temperature.
4. Turn engine control switch to OFF (TM 9-6115-749-10).
5. Open left- and right-side doors on generator set.
6. Remove battery ground cable (WP 0036, Remove/Install Batteries).
7. Remove top body panel (WP 0028, Remove/Install Top Body Panel).
8. Remove fuel injection lines and injectors (WP 0069, Remove/Install Fuel Injector).
9. Ensure valve cover and glow plugs are installed (WP 0082, Remove/Install Valve Cover and WP 0068, Remove/Install Glow Plugs).
10. Locate fuel injector opening (Figure 1).

TEST ENGINE COMPRESSION – CONTINUED

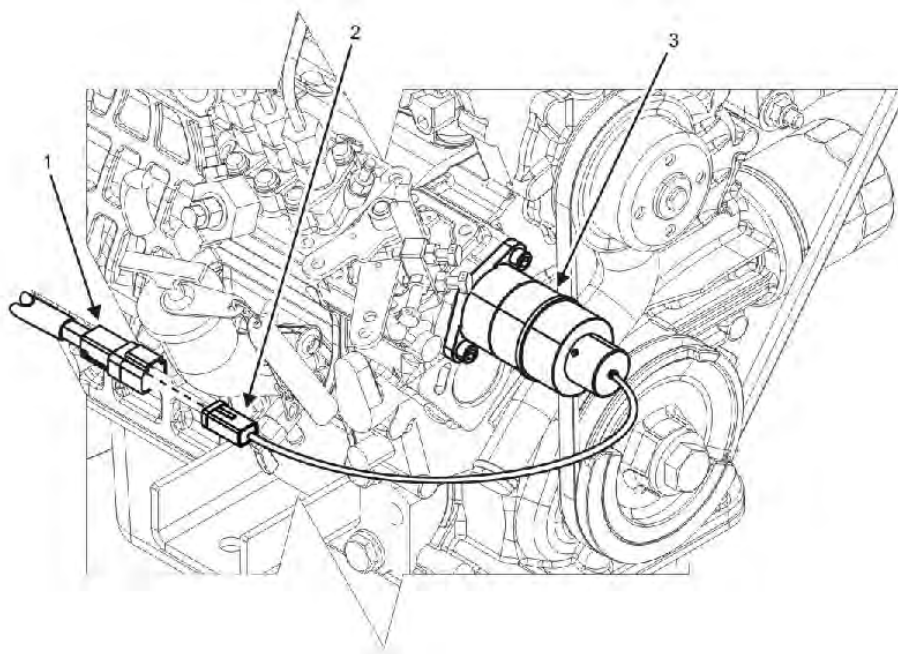


Figure 2. Governor Actuator Connector - Removal.

NOTE

Glow plugs must remain installed for this procedure. Test compression in each of the three cylinders, one at a time. The procedure for compression testing in all cylinders is the same.

11. Disconnect governor actuator (Figure 2, Item 3) electrical connector (Figure 2, Item 2) from wiring harness (Figure 2, Item 1).
12. Remove two nuts (Figure 3, Item 2) and engine front lifting bracket (Figure 3, Item 3) from engine.
13. Install battery ground cable (WP 0036, Remove/Install Batteries).
14. Crank engine for a few seconds using the DEAD CRANK SWITCH (TM 9-6115-749-10) to clear cylinders of any residual fuel.

TEST ENGINE COMPRESSION – CONTINUED

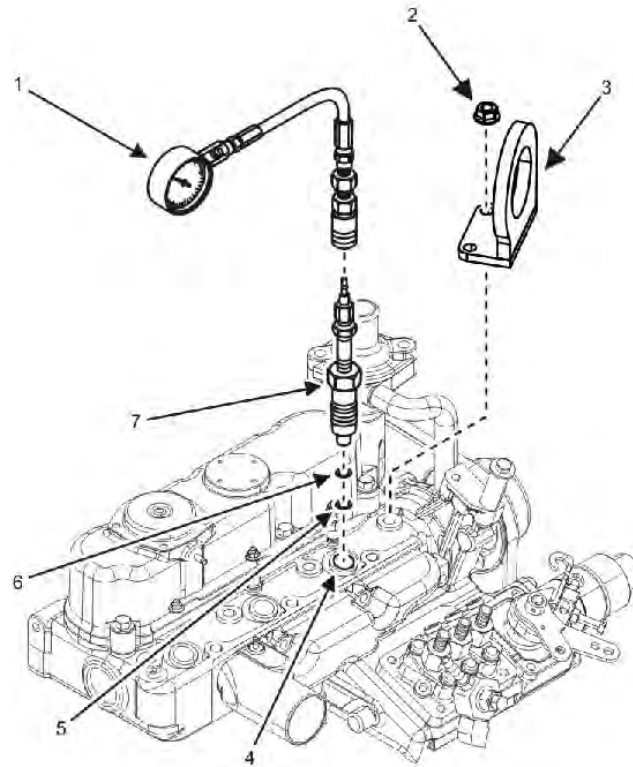


Figure 3. Compression Gauge in Fuel Injector Opening.

15. Install new heat seal (Figure 3, Item 5) and new copper gasket (Figure 3, Item 6) to compression adapter (Figure 3, Item 7) and install compression adapter (Figure 3, Item 7) and compression gauge (Figure 3, Item 1) to fuel injector opening of cylinder 1 (Figure 3, Item 4).

WARNING

Operating generator set with unit doors open or panels removed exposes personnel to a high noise level. Close unit doors and replace panels or wear hearing protection while operating or working near a running generator set. Failure to comply may cause injury or death to personnel.

CAUTION

Operating generator set with doors open or with panels removed for an extended length of time will cause engine to overheat. Do not operate generator with doors open or panels removed for longer than necessary to complete your task. Monitor DCS temperature indicator to prevent engine overheating. Failure to comply will cause damage to equipment.

NOTE

The compression gauge needle will show compression reading at each stroke and will hold the highest reading of the four strokes.

16. Energize main DC circuit breaker (TM 9-6115-749-10).
17. Move DEAD CRANK SWITCH to CRANK (TM 9-6115-749-10) and hold through four compression strokes.

TEST ENGINE COMPRESSION – CONTINUED

18. Note compression reading on gauge.

CAUTION

Release pressure from compression gauge (Figure 3, Item 1) using release button on gauge before removing gauge from engine. Failure to comply may cause damage to equipment.

19. Remove compression adapter (Figure 3, Item 7) and compression gauge (Figure 3, Item 1) from fuel injector opening of cylinder 1 (Figure 3, Item 4) and remove and discard heat seal (Figure 3, Item 5) and copper gasket (Figure 3, Item 6) from compression adapter (Figure 3, Item 7) or fuel injector opening on cylinder 1 (Figure 3, Item 4).
20. Repeat Steps 15 through 19 to record compression readings in cylinders 2 and 3.

NOTE

Factory specification for compression pressure is 512-583 psi (3.53-4.02 MPa). Lowest allowable limit is 370 psi (2.55 MPa).

21. Replace engine if compression pressure in any cylinder is not within specification (WP 0064, Remove/Install 50/60 Hz Engine Assembly or WP 0065, Remove/Install 400 Hz Engine Assembly).

NOTE

Compression pressures should not vary more than 10% between cylinders.

22. Compare compression pressure readings between cylinders.
23. Replace engine if compression pressures vary between cylinders by more than 10% (WP 0064, Remove/Install 50/60 Hz Engine Assembly or WP 0065, Remove/Install 400 Hz Engine Assembly).
24. Install two nuts (Figure 3, Item 2) and engine front lifting bracket (Figure 3, Item 3) to engine.
25. Connect governor actuator (Figure 2, Item 3) electrical connector (Figure 2, Item 2) to wiring harness (Figure 2, Item 1).
26. Install fuel injection lines and fuel injectors (WP 0069, Remove/Install Fuel Injector).
27. Install top panel (WP 0028, Remove/Install Top Body Panel).
28. Close generator set doors.
29. Purge fuel system (WP 0039, Service Fuel System).
30. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
31. Start engine and check for proper operation. Bring coolant to normal operating temperature and then apply a 100% rated load for 30 minutes (TM 9-6115-749-10).
32. Repair as required.
33. Check fuel level and fill as required (TM 9-6115-749-10).

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

TEST ENGINE OIL PRESSURE

INITIAL SETUP:**Test Equipment**

Test Set, Oil Systems Pressure (WP 0162, Table 2, Item 28)

Personnel Required

91D (1)

Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
Wrench, Torque, Dial, 3/8 in Drive, 300 in•lb (WP 0162, Table 2, Item 43)

References

WP 0010, Engine System Troubleshooting with a DCS Code
WP 0066, Service Lubrication System

Materials/Parts

Grease, electrically conductive (WP 0163, Table 1, Item 20)
Lubricating oil, engine (WP 0163, Table 1, Item 23)
Rag, wiping (WP 0163, Table 1, Item 31)
Sealant (WP 0163, Table 1, Item 32)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)

TEST ENGINE OIL PRESSURE**WARNING**

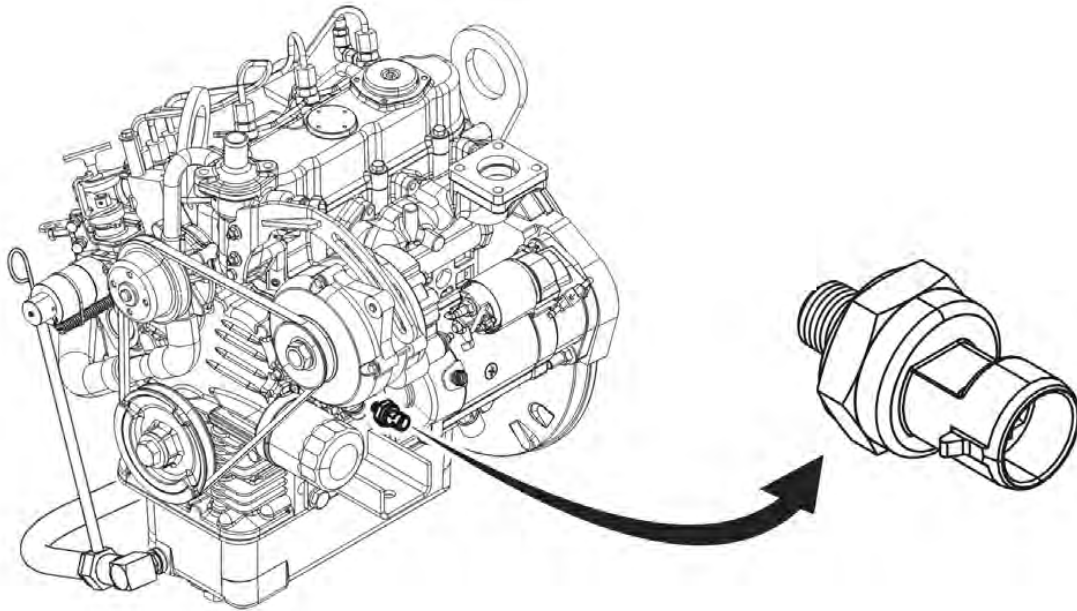
Exhaust discharge contains deadly gases, including carbon monoxide. Exhaust gases are most dangerous in places with poor ventilation. Do not operate generator set in an enclosed area unless exhaust discharge is properly vented. Failure to comply may cause injury or death to personnel.

WARNING

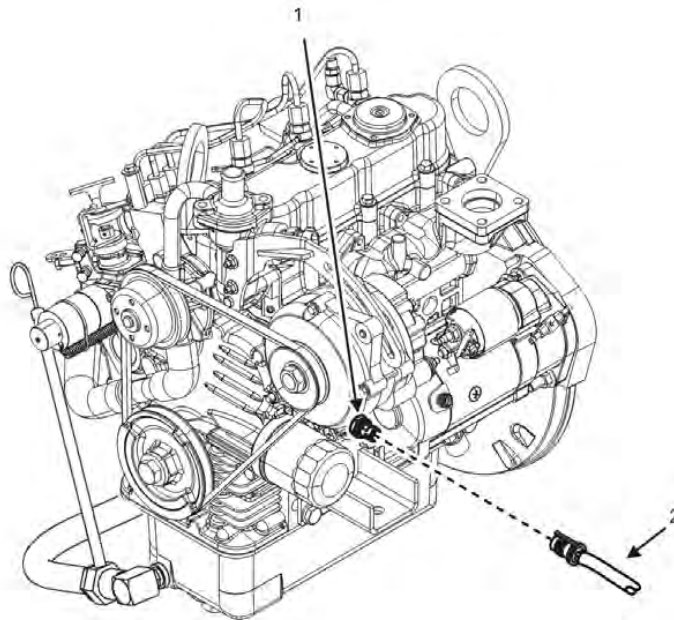
Starting engine when unit is partially disassembled is dangerous. Run engine in this condition only as long as required to test operation. Keep away from unprotected moving engine parts during operation. Failure to comply may cause injury or death to personnel.

Check Engine Oil Pressure

1. Ensure equipment conditions are met in order presented in initial setup.
2. Open left-side door on generator set.

TEST ENGINE OIL PRESSURE – CONTINUED**Figure 1. Engine Oil Pressure Sensor - Location.**

3. Locate engine oil pressure sensor (Figure 1).

**Figure 2. Engine Oil Pressure Sensor - Removal.**

4. Disconnect electrical lead (Figure 2, Item 2) from oil pressure sensor (Figure 2, Item 1).

TEST ENGINE OIL PRESSURE – CONTINUED**NOTE**

Place a wiping rag under oil pressure sensor to capture oil spilled upon removal. Dispose of soiled rag IAW local SOP.

5. Remove engine oil pressure sensor (Figure 2, Item 1) from engine oil pressure port and save for reuse.
6. Apply pipe sealant to threads of oil pressure gauge (Figure 3, Item 2).
7. Install oil pressure gauge (Figure 3, Item 2) into engine oil pressure port (Figure 3, Item 1).
8. Install battery ground cable (WP 0036, Remove/Install Batteries).
9. Set engine control switch to PRIME & RUN. Start engine and allow engine to reach normal operating temperature (TM 9-6115-749-10).

NOTE

The lowest allowable oil pressure at rated speed is 21 psi (145 kPa). Oil pressure reading should fall between 28-64 psi (193-441 kPa).

10. Observe engine oil pressure at rated speed.

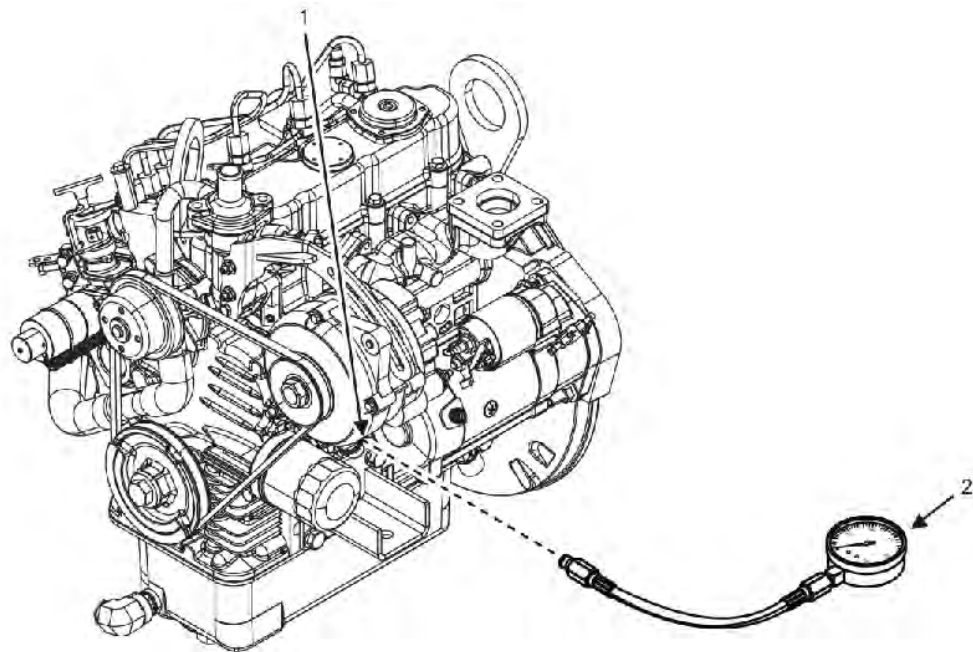


Figure 3. Check Engine Oil Pressure.

11. Shut down generator set (Engine control switch OFF (TM 9-6115-749-10, WP 0005)).
12. Determine and remedy cause of low engine oil pressure by troubleshooting IAW low pressure DCS code [Fault 415: Low Oil Pressure] (WP 0010, Engine System Troubleshooting with a DCS Code).
13. Remove battery ground cable (WP 0036, Remove/Install Batteries).
14. Remove oil pressure gauge (Figure 3, Item 2) from engine.
15. Apply pipe sealant to threads of oil pressure sensor (Figure 2, Item 1).
16. Install engine oil pressure sensor (Figure 2, Item 1) to engine oil pressure port. Torque oil pressure sensor to 130-174 in•lb (15-20 N•m).

TEST ENGINE OIL PRESSURE – CONTINUED

17. Connect electrical lead (Figure 2, Item 2) to oil pressure sensor (Figure 2, Item 1).
18. Install battery ground cable (WP 0036, Remove/Install Batteries).
19. Close left-side door.
20. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
21. Start engine and check for leaks and proper operation (TM 9-6115-749-10).
22. Repair as required.
23. Check engine oil level and fill as required (WP 0066, Service Lubrication System).
24. Dispose of soiled rags IAW local SOP.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE

REMOVE/INSTALL 50/60 HZ ENGINE ASSEMBLY

INITIAL SETUP:**Test Equipment**

Load Bank (WP 0162, Table 2, Item 2)

Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
 Torque Tube, 5-75 ft•lb (WP 0162, Table 2, Item 36)
 Torque Wrench Head End, 1/4x3/8 in Drive, 9/16 in (WP 0162, Table 2, Item 37)
 Wrench, Torque, Dial, 3/8 in Drive, 300 in•lb (WP 0162, Table 2, Item 43)
 Wrench, Torque, Click, Ratcheting, 1/2 in Drive, 250 ft•lb (WP 0162, Table 2, Item 40)

Materials/Parts

Assembly, engine (WP 0123, Item 1)
 Gasket, exhaust (WP 0107, Item 9)
 Isolator, vibration, engine mount (2) (WP 0120, Item 6)
 Nut, hex flange (4) (WP 0120, Item 4)
 Nut, hex, self-locking (2) (WP 0120, Item 1)
 Antifreeze, ethylene glycol (WP 0163, Table 1, Item 2)
 Cap set, protective (WP 0163, Table 1, Item 8)
 Cloth, abrasive, crocus (WP 0163, Table 1, Item 11)
 Compound, antiseize (WP 0163, Table 1, Item 13)
 Distilled water (WP 0163, Table 1, Item 17)
 Fuel, diesel (WP 0163, Table 1, Item 19)
 Grease, electrically conductive (WP 0163, Table 1, Item 20)
 Lubricating oil, engine (WP 0163, Table 1, Item 23)
 Pan, drain (WP 0163, Table 1, Item 28)
 Penetrating oil (WP 0163, Table 1, Item 29)
 Rag, wiping (6) (WP 0163, Table 1, Item 31)
 Sealant (WP 0163, Table 1, Item 32)
 Soap, Ivory (WP 0163, Table 1, Item 33)

Materials/Parts - cont'd

Tag, marker (WP 0163, Table 1, Item 35)

Personnel Required

91D (1)
 Assistant (1)

References

WP 0059, Remove/Install Engine Wiring Harness

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool
 Batteries removed (WP 0036, Remove/Install Batteries)
 Fuel drained (WP 0039, Service Fuel System)
 Coolant drained (WP 0021, Service Cooling System)
 Engine oil drained (WP 0066, Service Lubrication System)
 Top body panel removed (WP 0028, Remove/Install Top Body Panel)
 Left-side body panel removed (WP 0031, Remove/Install Left-side Body Panel)
 Right-side body panel removed (WP 0032, Remove/Install Right-side Body Panel)
 AC generator removed from engine flywheel and flywheel housing (WP 0049, Remove/Install 50/60 Hz AC Generator Assembly)
 Upper and lower radiator hoses and tubes removed from engine (WP 0024, Remove/Install Radiator Hose and Tube Assemblies)
 Fuel filter/water separator removed (WP 0042, Remove/Install Fuel Filter/Water Separator Assembly)
 Front body panel removed (WP 0029, Remove/Install Front Body Panel)
 Exhaust flex pipe removed from engine (WP 0080, Remove/Install Exhaust Manifold)
 Winterization kit and mounting bracket removed (if installed) (WP 0025, Remove/Install Winterization Kit Components)
 Wiring removed from battery-charging alternator (WP 0075, Remove/Install Battery-Charging Alternator Assembly)
 Wiring removed from starter (WP 0077, Remove/Install Starter)

INITIAL SETUP: – CONTINUED

REMOVE/INSTALL 50/60 HZ ENGINE ASSEMBLY**WARNING**

Engine assembly weighs approximately 355 lb (161 kg). Use suitable lifting device with the capacity to lift the weight of the engine assembly. Failure to comply may cause injury or death to personnel.

WARNING

Comply with all lifting requirements. Observe the decals on equipment and parts that identify the weight and determine if assistance is needed. Maximum lift is 37 lb (16.8 kg) for one person, 74 lb (33.6 kg) for two persons, and 101 lb (45.8 kg) for three persons. Failure to comply may cause injury or death to personnel.

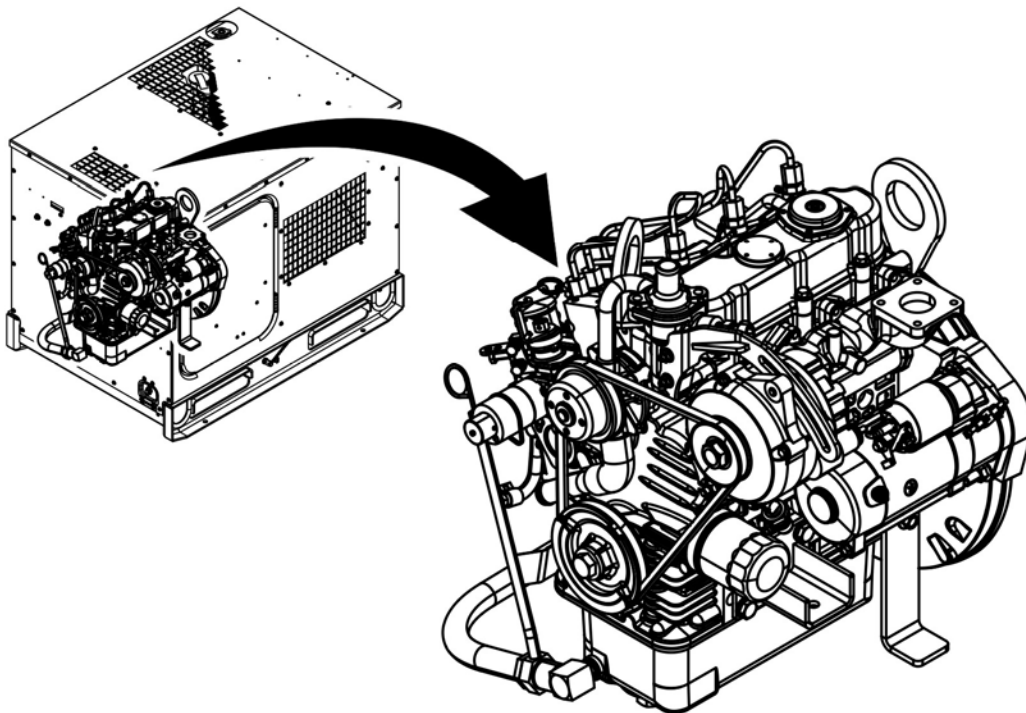
Remove 50/60 Hz Engine Assembly

Figure 1. Engine - Location.

NOTE

Cap/plug all open fuel lines/fittings and cooling ports and hoses to prevent dirt and debris from entering the engine.

Tag all electrical wires and connectors prior to removal to aid installation. Remove tags from wires and connectors at installation.

REMOVE/INSTALL 50/60 HZ ENGINE ASSEMBLY – CONTINUED

All parts removed or disconnected from the engine assembly are intended for reuse at time of reassembly unless they are damaged and must be replaced.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate engine on generator set skid (Figure 1).

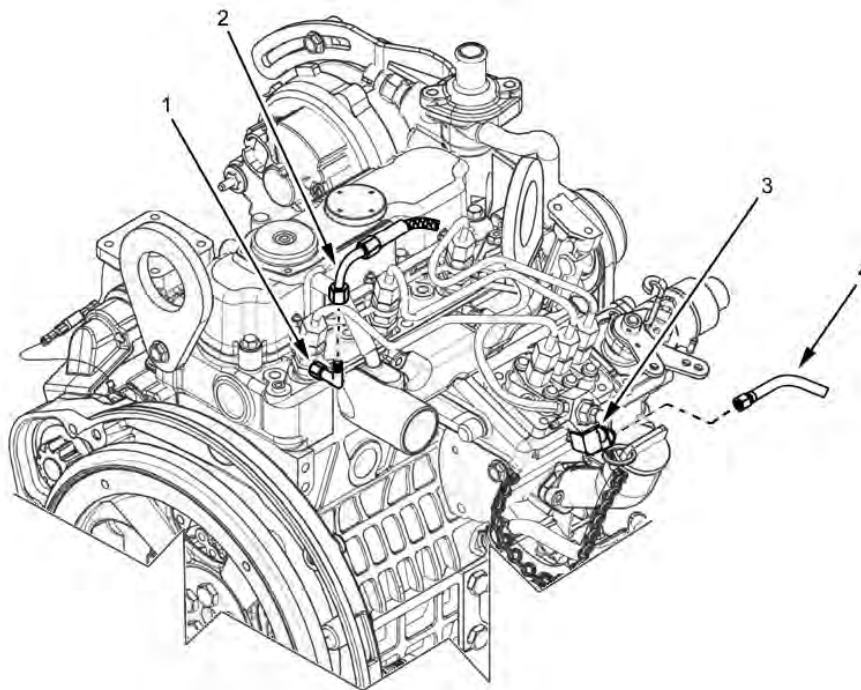


Figure 2. Fuel Injection Pump Lines - Removal.

WARNING

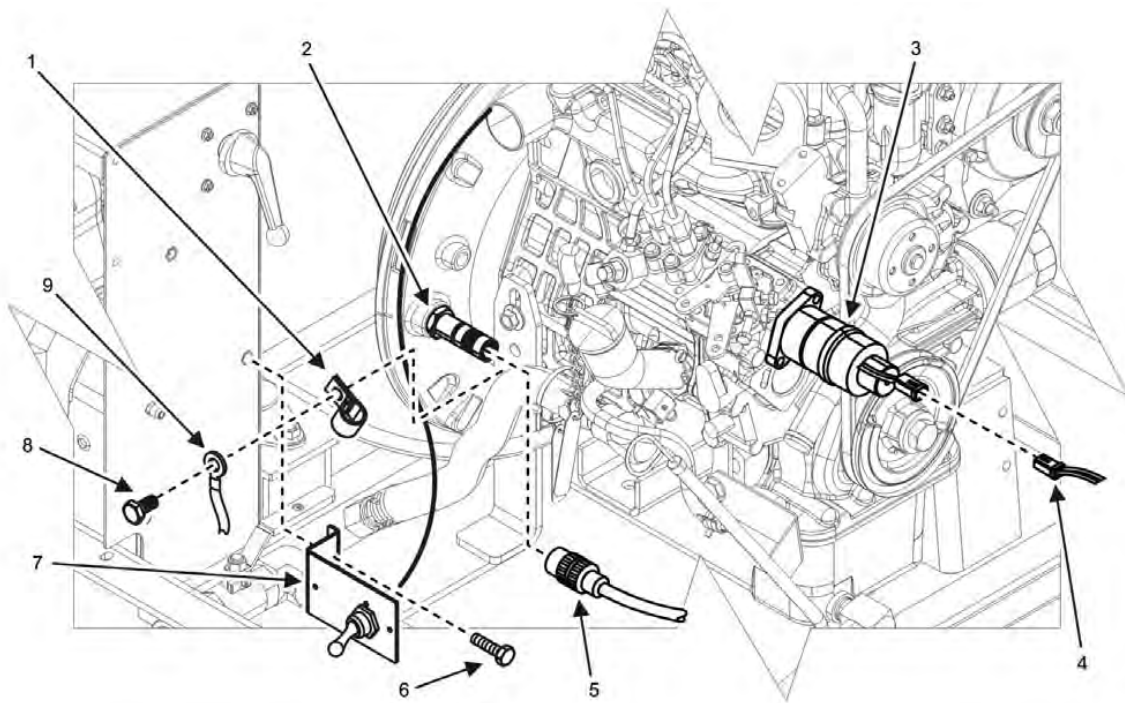
Fuel is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash exposed skin and change soaked clothing promptly if exposed to fuel. Failure to comply may cause injury or death to personnel.

WARNING

Fuels used in the generator set are combustible. Do not smoke or use open fire when performing maintenance. Fire and possible explosion may result. Failure to comply may cause injury or death to personnel and damage to equipment.

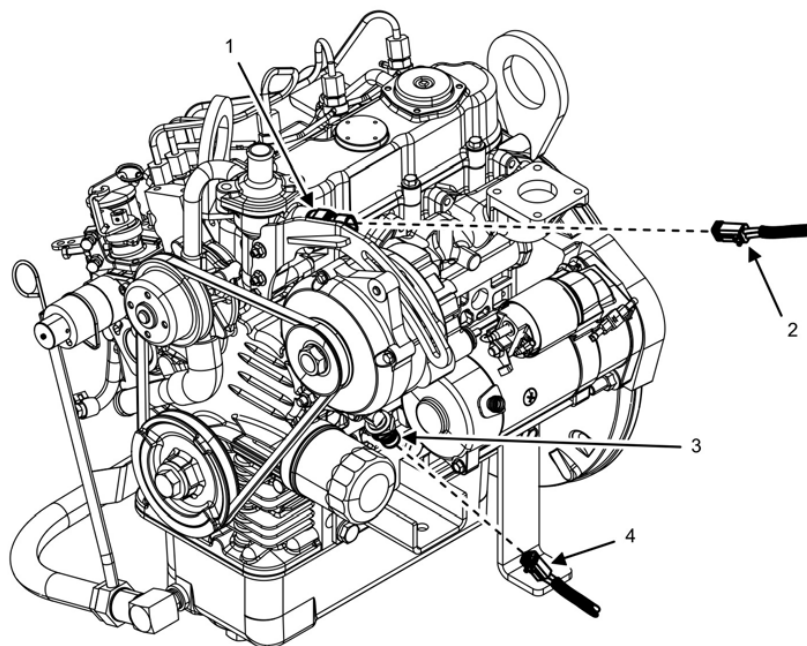
3. Remove fuel supply hose (Figure 2, Item 4) from fuel injection pump (Figure 2, Item 3). Cap/plug hose and fuel injection pump openings to prevent dirt and debris from entering fuel system.
4. Inspect fuel supply hose (Figure 2, Item 4) for obvious signs of damage and replace as required.
5. Remove fuel vent hose (Figure 2, Item 2) from fuel injection overflow tube (Figure 2, Item 1). Cap/plug fuel vent hose and fuel injection overflow tube openings to prevent dirt and debris from entering fuel system.
6. Inspect fuel vent hose (Figure 2, Item 2) for obvious signs of damage and replace as required.

REMOVE/INSTALL 50/60 HZ ENGINE ASSEMBLY – CONTINUED

**Figure 3. Electrical Connectors Right-Side.**

7. Disconnect electrical connectors at the following locations:
 - a. Electrical connector (Figure 3, Item 4) at engine governor actuator (Figure 3, Item 3).
 - b. Electrical connector (Figure 3, Item 5) at the engine speed sensor (Figure 3, Item 2).
8. Inspect electrical connectors (Figure 3, Items 4 and 5) for signs of obvious damage.
9. Replace engine wiring harness if electrical connectors (Figure 3, Items 4 and 5) are damaged (WP 0059, Remove/Install Engine Wiring Harness).
10. Remove screw (Figure 3, Item 6) securing DEAD CRANK SWITCH bracket (Figure 3, Item 7) to interior body panel (not shown) if not already removed.
11. Move DEAD CRANK SWITCH bracket (Figure 3, Item 7) and wire away from top of engine assembly to allow clearance for engine removal.
12. Remove bolt (Figure 3, Item 8), P37 drain wire (Figure 3, Item 9), and loop clamp (Figure 3, Item 1) from right-side of engine block.

REMOVE/INSTALL 50/60 HZ ENGINE ASSEMBLY – CONTINUED

**Figure 4. Electrical Connectors Exhaust-Side - Removal.****NOTE**

Cap/plug all open lubrication lines/fittings to prevent dirt and debris from entering the lubrication system. Capture spilled engine oil and dispose of soiled rags IAW local SOP.

13. Disconnect electrical connectors at the following locations on the exhaust-side of engine.
 - a. Electrical connector (Figure 4, Item 2) at engine coolant temperature sensor (Figure 4, Item 1).
 - b. Electrical connector (Figure 4, Item 4) at engine oil pressure sender (Figure 4, Item 3).
14. Inspect electrical connectors (Figure 4, Items 2 and 4) for signs of obvious damage.
15. Replace engine wiring harness if electrical connectors (Figure 4, Items 2 and 4) are damaged (WP 0059, Remove/Install Engine Wiring Harness).

REMOVE/INSTALL 50/60 HZ ENGINE ASSEMBLY – CONTINUED

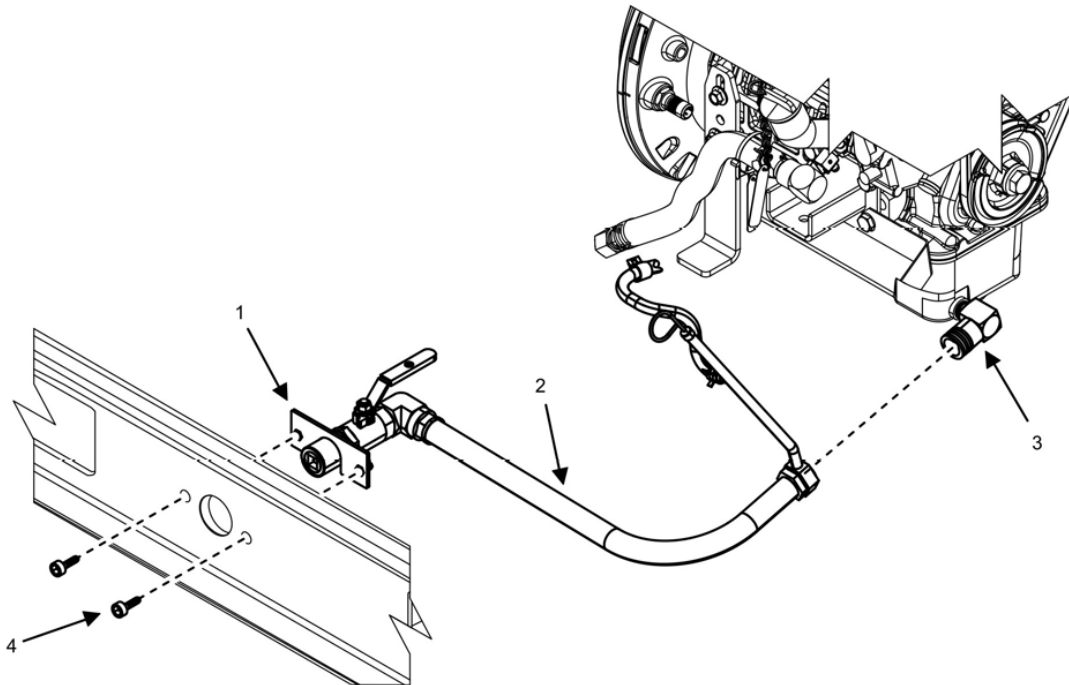


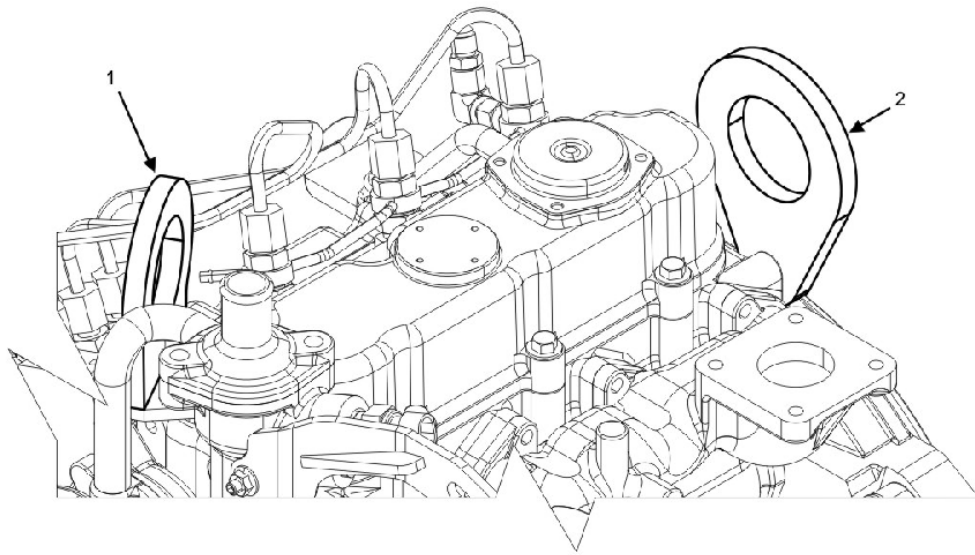
Figure 5. Engine Oil Drain Hose Assembly - Removal.

16. Remove two hex socket head screws (Figure 5, Item 4) that secure bulkhead fitting (Figure 5, Item 1) to unit skid.
17. Place wiping rags under engine oil drain hose assembly (Figure 5, Item 2) to capture any residual oil.

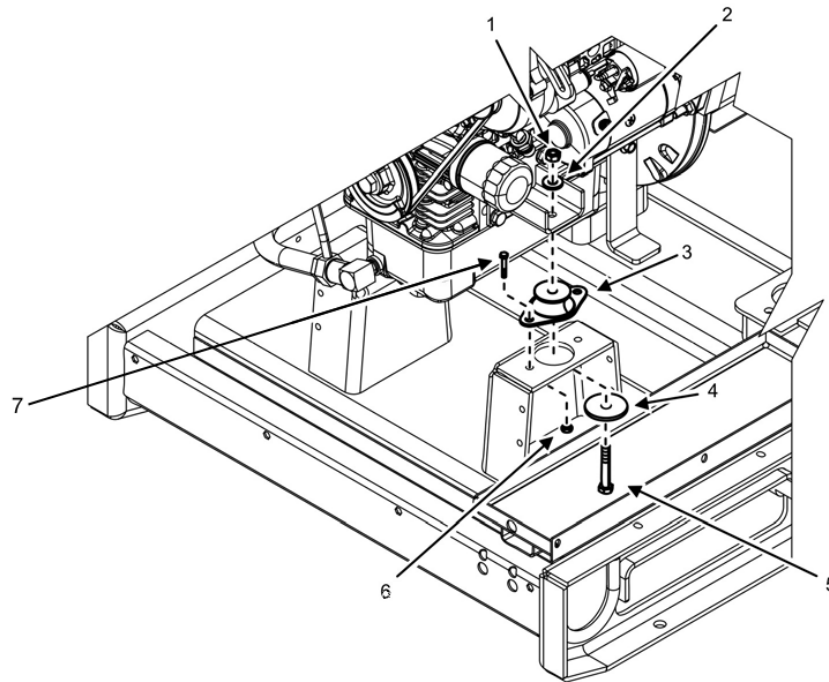
NOTE

Two wrenches are needed to separate engine oil drain hose assembly (Figure 5, Item 2) from 90° elbow fitting (Figure 5, Item 3) at engine oil pan.

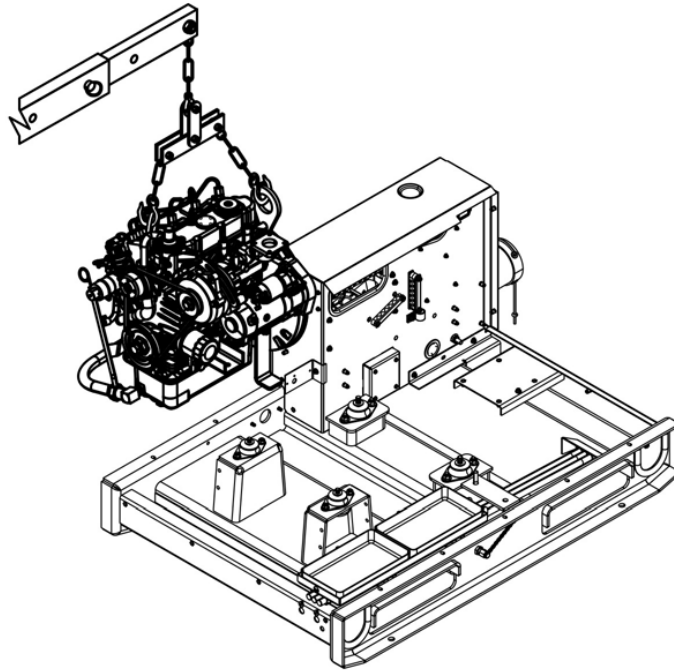
18. Remove oil drain hose assembly (Figure 5, Item 2) at 90° elbow fitting (Figure 5, Item 3) at oil pan.
19. Dispose of soiled rags IAW local SOP.

REMOVE/INSTALL 50/60 HZ ENGINE ASSEMBLY – CONTINUED**Figure 6. Lifting Eyes - Detail.**

20. Inspect lifting eyes (Figure 6, Items 1 and 2) for damage and missing or loose attaching hardware (not shown).
21. Replace damaged lifting eyes (Figure 6, Items 1 and 2) and missing hardware (not shown) as required.
22. Torque loose lifting eye hardware (not shown) to 17-21 ft•lb (23-29 N•m) as required.
23. Attach suitable lifting device to lifting eyes (Figure 6, Items 1 and 2) of engine.
24. Raise lifting device to remove slack in chains.

REMOVE/INSTALL 50/60 HZ ENGINE ASSEMBLY – CONTINUED**Figure 7. Engine Mounts - Removal.**

25. Remove engine mounting bolt (Figure 7, Item 5), snubbing washer (Figure 7, Item 4), flat washer (Figure 7, Item 2), and locknut (Figure 7, Item 1) securing engine mount plate to left-side vibration isolator (Figure 7, Item 3). Discard locknut (Figure 7, Item 1).
26. Remove two bolts (Figure 7, Item 7) and two locknuts (Figure 7, Item 6) that secure vibration isolator (Figure 7, Item 3) to unit skid. Discard locknuts (Figure 7, Item 6).
27. Remove and discard vibration isolator (Figure 7, Item 3) from unit skid.
28. Repeat Steps 25 through 27 for right-side vibration isolator.

REMOVE/INSTALL 50/60 HZ ENGINE ASSEMBLY – CONTINUED**Figure 8. Engine - Removal.****WARNING**

When lifting engine, use lifting equipment with minimum lifting capacity of 1,000 lb (453.6 kg). Do not stand or put arms, legs, or any body part under hoisted load. Do not permit generator set to swing. Failure to comply may cause injury or death to personnel.

29. Lift engine slightly until free of engine mounts using suitable lifting device (Figure 8).
30. Pull engine away from generator set using lifting device (Figure 8).
31. Secure engine to engine stand or other suitable work surface.
32. Remove lifting device from engine.

END OF TASK**Inspect 50/60 Hz Engine Assembly**

1. Inspect engine components for signs of obvious damage.
2. Replace damaged components as required.
3. Inspect all bolts and washers for damage, deterioration, or wear and replace as required.
4. Inspect mounting location on unit skid for damage, corrosion, or cracks. Replace unit skid as required.

END OF TASK**Install 50/60 Hz Engine Assembly**

1. Position two new vibration isolators (Figure 7, Item 3) to mounting locations on unit skid and secure to each location by installing two bolts (Figure 7, Item 7) and two new locknuts (Figure 7, Item 6) finger-tight.

REMOVE/INSTALL 50/60 HZ ENGINE ASSEMBLY – CONTINUED

2. Torque new locknuts (Figure 7, Item 6) to 18-21 ft•lb (24-29 N•m).
3. Inspect lifting eyes (Figure 6, Items 1 and 2) for damage and missing or loose attaching hardware (not shown).
4. Replace damaged lifting eyes (Figure 6, Items 1 and 2) and missing hardware (not shown) as required.
5. Torque loose lifting eye hardware (not shown) to 17-21 ft•lb (23-29 N•m) as required.
6. Attach suitable lifting device to lifting eyes (Figure 6, Items 1 and 2) of engine.
7. Raise engine assembly using lifting device.
8. Position engine to its approximate mounting location in unit skid.
9. Clean mating surfaces of engine flywheel using a crocus cloth.
10. Apply antiseize compound to mating surfaces of engine flywheel to minimize corrosion of dissimilar metals.
11. Lower engine slowly, using lifting device, until mounting holes on engine mounts align with vibration isolator (Figure 7, Item 3).
12. Insert engine mounting bolts (Figure 7, Item 5) upside-down in engine mount to temporarily secure engine to vibration isolator (Figure 7, Item 3) on unit skid.
13. Remove left-side engine mounting bolt (Figure 7, Item 5) installed upside-down.
14. Install snubbing washer (Figure 7, Item 4) to engine mounting bolt (Figure 7, Item 5).
15. Install engine mounting bolt (Figure 7, Item 5) with snubbing washer (Figure 7, Item 4) through unit skid and bottom of vibration isolator (Figure 7, Item 3) on left-side of skid.
16. Install new locknut (Figure 7, Item 1) and flat washer (Figure 7, Item 2) to engine mounting bolt (Figure 7, Item 5) finger-tight to secure engine to skid and vibration isolator (Figure 7, Item 3).
17. Repeat Steps 13 through 16 to install engine mounting bolt (Figure 7, Item 5) to right-side of skid.
18. Torque new locknuts (Figure 7, Item 1) to 39-47 ft•lb (53-63 N•m).
19. Remove lifting device from engine.

NOTE

Prior to installation of engine oil drain hose assembly (Figure 5, Item 2), remove all caps/plugs from oil hoses/fittings. Capture spilled engine oil and dispose of IAW local SOP.

Two wrenches are needed to install engine oil drain hose assembly (Figure 5, Item 2) and fittings to engine oil pan.

Apply pipe joint compound to threads of fittings before reassembly.

20. Apply pipe joint compound to 90° elbow fitting (Figure 5, Item 3) and install engine oil drain hose assembly (Figure 5, Item 2) to 90° elbow fitting (Figure 5, Item 3) in engine oil pan.
21. Position engine oil drain hose assembly bulkhead fitting (Figure 5, Item 1) to its mounting position on unit skid.
22. Ensure engine oil drain hose assembly (Figure 5, Item 2) lies flat on unit skid.
23. Secure bulkhead fitting (Figure 5, Item 1) to unit skid by installing two hex socket head screws (Figure 5, Item 4).
24. Dispose of soiled rags IAW local SOP.

NOTE

Use tags placed on sensors/senders and wiring harness at removal to assist installation. Leave tags on electrical components until generator set is running properly.

25. Secure electrical connectors at the following locations on exhaust side of engine:

REMOVE/INSTALL 50/60 HZ ENGINE ASSEMBLY – CONTINUED

- a. Electrical connector (Figure 4, Item 2) at engine coolant temperature sensor (Figure 4, Item 1).
 - b. Electrical connector (Figure 4, Item 4) at engine oil pressure sender (Figure 4, Item 3).
- 26. Install bolt (Figure 3, Item 8), P37 drain wire (Figure 3, Item 9), and loop clamp (Figure 3, Item 1) to engine block. Torque bolt (Figure 3, Item 8) to 35-42 ft•lb (48-57 N•m).
 - 27. Position wiring for DEAD CRANK SWITCH across rear of engine assembly and position DEAD CRANK SWITCH bracket (Figure 3, Item 7) to its mounting location on interior body panel and align the mounting holes.
 - 28. Secure DEAD CRANK SWITCH bracket (Figure 3, Item 7) to interior body panel by installing screw (Figure 3, Item 6).
 - 29. Secure electrical connectors at the following locations on intake side of engine:
 - a. Electrical connector (Figure 3, Item 4) at engine governor actuator (Figure 3, Item 3).
 - b. Electrical connector (Figure 3, Item 5) at the engine speed sensor (Figure 3, Item 2).

NOTE

Prior to installation, remove all caps/plugs from fuel lines/fittings.

- 30. Install fuel vent hose (Figure 2, Item 2) to fuel injection overflow tube (Figure 2, Item 1).
- 31. Install fuel supply hose (Figure 2, Item 4) to fuel injection pump (Figure 2, Item 3).
- 32. Install starter wiring (WP 0077, Remove/Install Starter).
- 33. Install battery-charging alternator wiring (WP 0075, Remove/Install Battery-Charging Alternator Assembly).
- 34. Install winterization kit and mounting bracket (WP 0025, Remove/Install Winterization Kit Components).
- 35. Install exhaust flex pipe (WP 0080, Remove/Install Exhaust Manifold).
- 36. Install front body panel (WP 0029, Remove/Install Front Body Panel).
- 37. Install fuel filter/water separator (WP 0042, Remove/Install Fuel Filter/Water Separator Assembly).
- 38. Install radiator hoses (WP 0024, Remove/Install Radiator Hose and Tube Assemblies).
- 39. Install AC generator (WP 0049, Remove/Install 50/60 Hz AC Generator Assembly).
- 40. Install right-side body panel (WP 0032, Remove/Install Right-Side Body Panel).
- 41. Install left-side body panel (WP 0031, Remove/Install Left-Side Body Panel).
- 42. Install top body panel (WP 0028, Remove/Install Top Body Panel).
- 43. Fill engine oil (WP 0066, Service Lubrication System).
- 44. Fill coolant (WP 0021, Service Cooling System).
- 45. Fill fuel tank (WP 0039, Service Fuel System).
- 46. Install batteries (WP 0036, Remove/Install Batteries).
- 47. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
- 48. Start engine and check for proper operation and fluid leaks. Bring coolant to normal operating temperature and then apply a 100% rated load for 30 minutes (TM 9-6115-749-10).
- 49. Repair as required.
- 50. Turn engine control switch to OFF (TM 9-6115-749-10).
- 51. Remove all temporary identification tags/markings from electrical components.
- 52. Ensure oil and coolant levels are at proper operating level (TM 9-6115-749-10).

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE

REMOVE/INSTALL 400 HZ ENGINE ASSEMBLY

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
 Torque Tube, 5-75 ft•lb (WP 0162, Table 2, Item 36)
 Torque Wrench Head End, 1/4x3/8 in Drive, 9/16 in (WP 0162, Table 2, Item 37)
 Wrench, Torque, Click, Ratcheting, 3/8 in Drive, 75 ft•lb (WP 0162, Table 2, Item 41)

Materials/Parts

Assembly, engine (WP 0123, Item 1)
 Gasket, exhaust (WP 0107, Item 9)
 Isolator, vibration, engine mount (2) (WP 0120, Item 6)
 Washer, lock (WP 0122, Item 13)
 Nut, hex flange (WP 0120, Item 4)
 Antifreeze, ethylene glycol (WP 0163, Table 1, Item 2)
 Cap set, protective (WP 0163, Table 1, Item 8)
 Cloth, abrasive, crocus (WP 0163, Table 1, Item 11)
 Compound, antiseize (WP 0163, Table 1, Item 13)
 Distilled water (WP 0163, Table 1, Item 17)
 Fuel, diesel (WP 0163, Table 1, Item 19)
 Grease, electrically conductive (WP 0163, Table 1, Item 20)
 Lubricating oil, engine (WP 0163, Table 1, Item 23)
 Pan, drain (WP 0163, Table 1, Item 28)
 Penetrating oil (WP 0163, Table 1, Item 29)
 Rag, wiping (6) (WP 0163, Table 1, Item 31)
 Sealant (WP 0163, Table 1, Item 32)
 Soap, Ivory (WP 0163, Table 1, Item 33)
 Tag, marker (WP 0163, Table 1, Item 35)

Personnel Required

91D (1)
 Assistant (1)

References

WP 0059, Remove/Install Engine Wiring Harness

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool
 Batteries removed (WP 0036, Remove/Install Batteries)
 Fuel drained (WP 0039, Service Fuel System)
 Coolant drained (WP 0021, Service Cooling System)
 Engine oil drained (WP 0066, Service Lubrication System)
 Top body panel removed (WP 0028, Remove/Install Top Body Panel)
 Upper and lower radiator hoses and tubes removed from engine (WP 0024, Remove/Install Radiator Hose and Tube Assemblies)
 Fuel filter/water separator removed (WP 0042, Remove/Install Fuel Filter/Water Separator Assembly)
 Front body panel removed (WP 0029, Remove/Install Front Body Panel)
 Left-side body panel removed (WP 0031, Remove/Install Left-side Body Panel)
 Right-side body panel removed (WP 0032, Remove/Install Right-side Body Panel)
 Muffler removed (WP 0081, Remove/Install Muffler)
 Exhaust flex pipe removed from engine (WP 0080, Remove/Install Exhaust Manifold)
 Unit bulkhead removed (WP 0035, Remove/Install Interior Body Panels)
 Winterization kit and mounting bracket removed (if installed) (WP 0025, Remove/Install Winterization Kit Components)
 Wiring removed from battery-charging alternator (WP 0075, Remove/Install Battery-Charging Alternator Assembly)
 Wiring removed from starter (WP 0077, Remove/Install Starter)

REMOVE/INSTALL 400 HZ ENGINE ASSEMBLY**WARNING**

Engine assembly weighs approximately 355 lb (161 kg). Use suitable lifting device with the capacity to lift the weight of the engine assembly. Failure to comply may cause injury or death to personnel.

WARNING

Comply with all lifting requirements. Observe the decals on equipment and parts that identify the weight and determine if assistance is needed. Maximum lift is 37 lb (16.8 kg) for one person, 74 lb (33.6 kg) for two persons, and 101 lb (45.8 kg) for three persons. Failure to comply may cause injury or death to personnel.

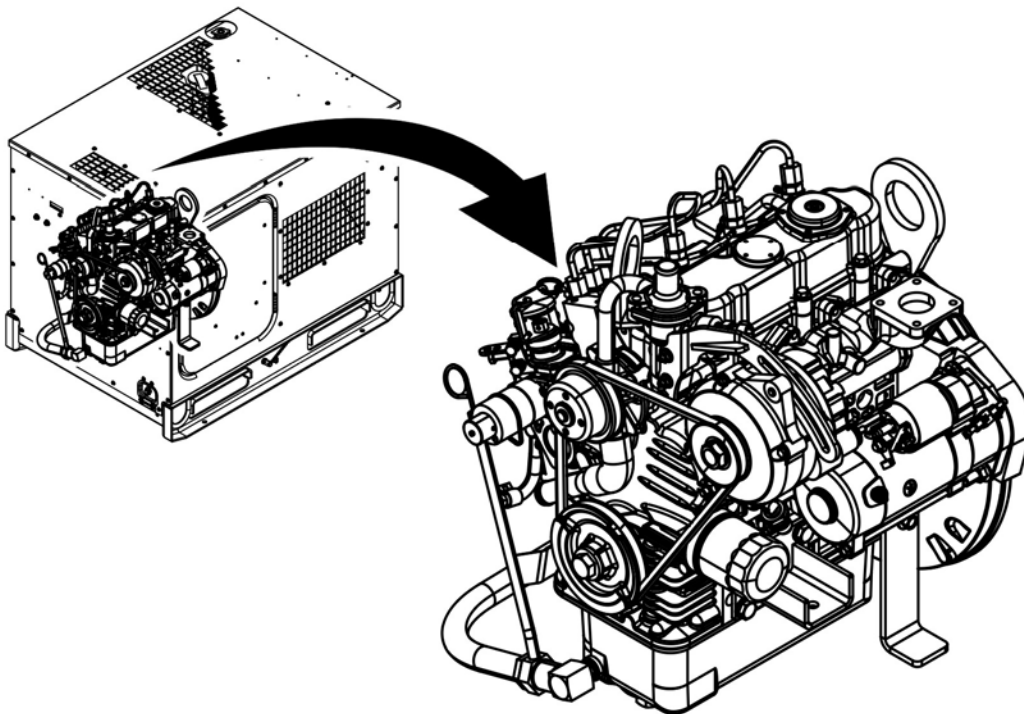
Remove 400 Hz Engine Assembly

Figure 1. Engine - Location.

NOTE

Cap/plug all open fuel lines/fittings and cooling ports and hoses to prevent dirt and debris from entering the engine.

Tag all electrical wires and connectors prior to removal to aid installation. Remove tags from wires and connectors at installation.

All parts removed or disconnected from the engine assembly are intended for reuse at time of reassembly unless they are damaged and must be replaced.

1. Ensure equipment conditions are met in order presented in initial setup.

REMOVE/INSTALL 400 HZ ENGINE ASSEMBLY – CONTINUED

2. Locate engine on generator set skid (Figure 1).

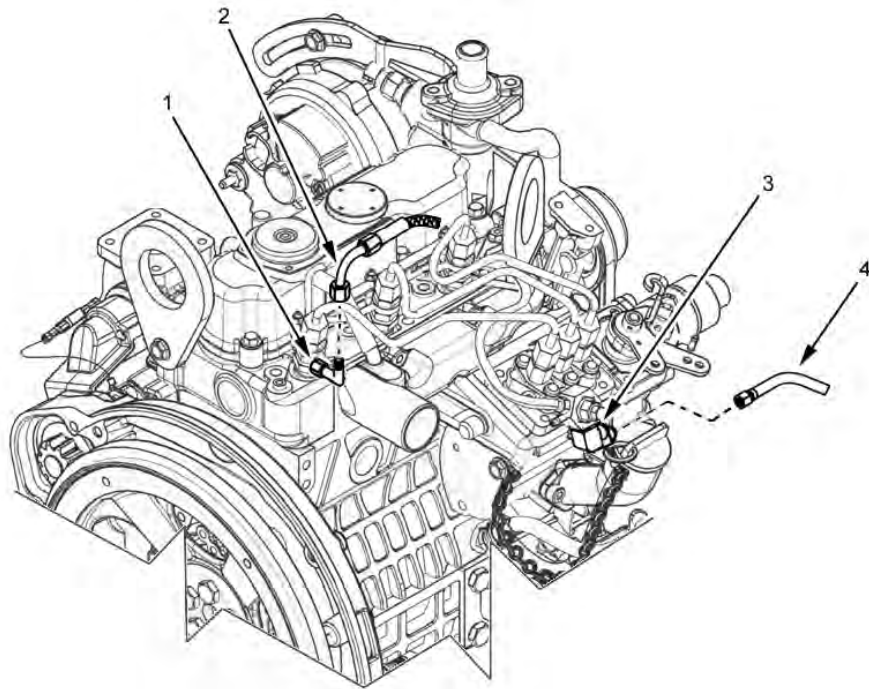


Figure 2. Fuel Injection Pump Lines - Removal.

WARNING

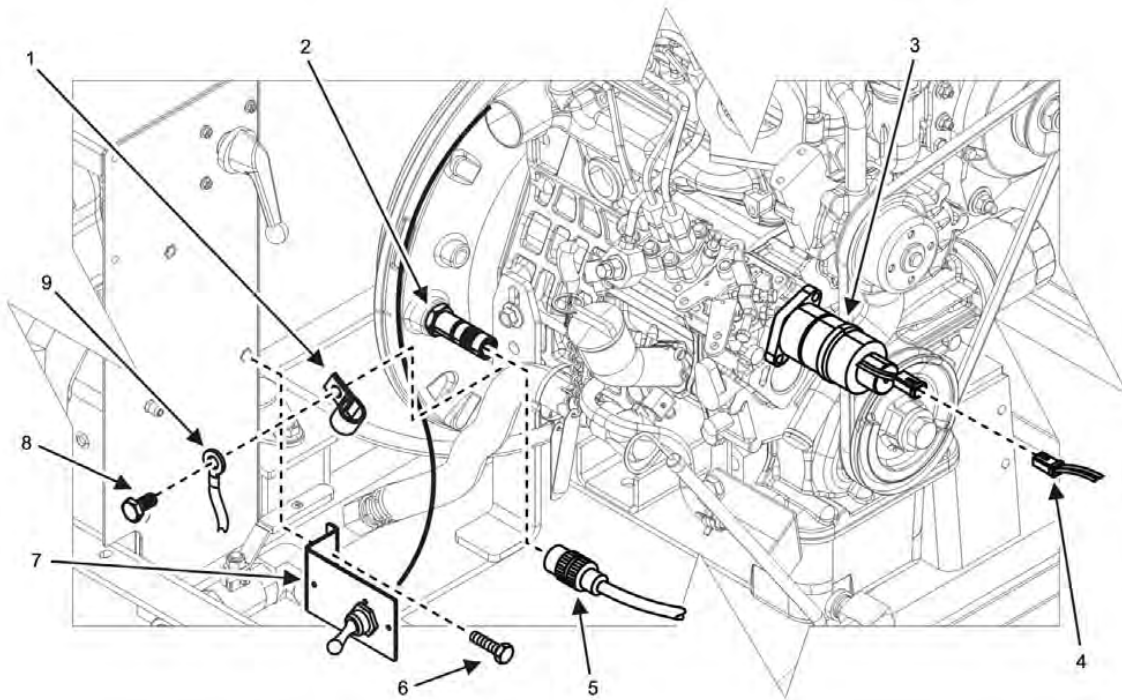
Fuel is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash skin and change clothing promptly if in contact with fuel. Failure to comply may cause injury or death to personnel.

WARNING

Fuels used in the generator set are combustible. Do not smoke or use open fire when performing maintenance. Fire and possible explosion may result. Failure to comply may cause injury or death to personnel and damage to equipment.

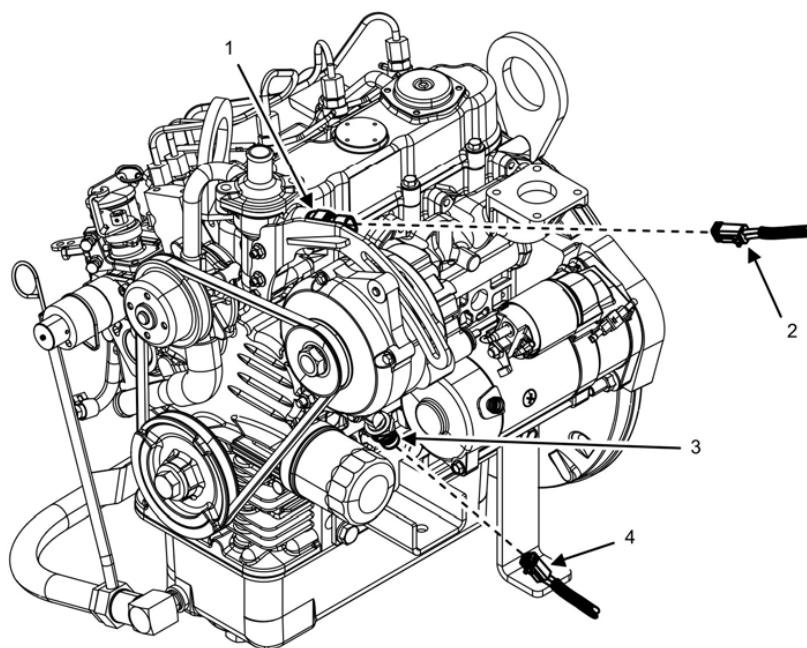
3. Remove fuel supply hose (Figure 2, Item 4) from fuel injection pump (Figure 2, Item 3). Cap/plug hose and fuel injection pump openings to prevent dirt and debris from entering fuel system.
4. Inspect fuel supply hose (Figure 2, Item 4) for obvious signs of damage and replace as required.
5. Remove fuel vent hose (Figure 2, Item 2) from fuel injection overflow tube (Figure 2, Item 1). Cap/plug fuel vent hose and fuel injection overflow tube openings to prevent dirt and debris from entering fuel system.
6. Inspect fuel vent hose (Figure 2, Item 2) for obvious signs of damage and replace as required.

REMOVE/INSTALL 400 HZ ENGINE ASSEMBLY – CONTINUED

**Figure 3. Electrical Connectors - Removal.**

7. Disconnect electrical connectors at the following locations:
 - a. Electrical connector (Figure 3, Item 4) at engine governor actuator (Figure 3, Item 3).
 - b. Electrical connector (Figure 3, Item 5) at the engine speed sensor (Figure 3, Item 2).
8. Inspect electrical connectors (Figure 3, Items 4 and 5) for signs of obvious damage.
9. Replace engine wiring harness if electrical connectors (Figure 3, Items 4 and 5) are damaged (WP 0059, Remove/Install Engine Wiring Harness).
10. Remove screw (Figure 3, Item 6) securing DEAD CRANK SWITCH bracket (Figure 3, Item 7) to interior body panel.
11. Remove bolt (Figure 3, Item 8), P37 drain wire (Figure 3, Item 9), and loop clamp (Figure 3, Item 1) from right-side of engine block.

REMOVE/INSTALL 400 HZ ENGINE ASSEMBLY – CONTINUED

**Figure 4. Electrical Connectors Exhaust-Side - Removal.****NOTE**

Cap/plug all open lubrication lines/fittings to prevent dirt and debris from entering the lubrication system. Capture spilled engine oil and dispose of soiled rags IAW local SOP.

12. Disconnect electrical connectors at the following locations on the exhaust-side of engine.
 - a. Electrical connector (Figure 4, Item 2) at engine coolant temperature sensor (Figure 4, Item 1).
 - b. Electrical connector (Figure 4, Item 4) at engine oil pressure sender (Figure 4, Item 3).
13. Inspect electrical connectors (Figure 4, Items 2 and 4) for signs of obvious damage.
14. Replace engine wiring harness if electrical connectors (Figure 4, Items 2 and 4) are damaged (WP 0059, Remove/Install Engine Wiring Harness).

REMOVE/INSTALL 400 HZ ENGINE ASSEMBLY – CONTINUED

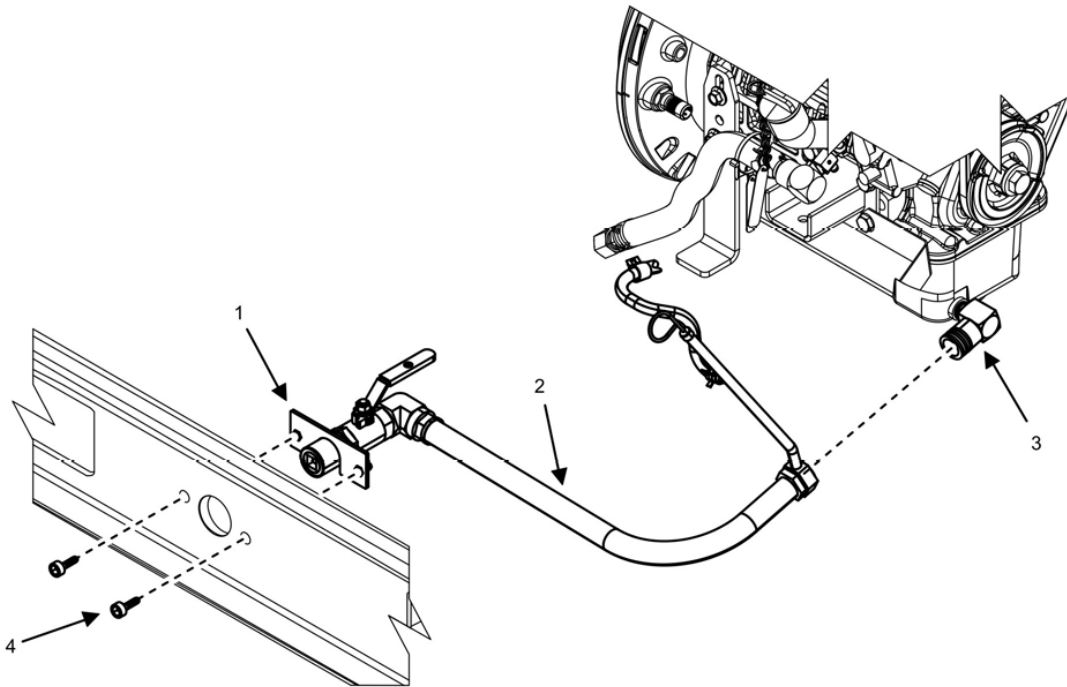


Figure 5. Engine Oil Drain Hose Assembly - Removal.

15. Remove two hex socket head screws (Figure 5, Item 4) that secure bulkhead fitting (Figure 5, Item 1) to unit skid.
16. Place wiping rags under engine oil drain hose assembly (Figure 5, Item 2) to capture any residual oil.

NOTE

Two wrenches are needed to separate engine oil drain hose assembly (Figure 5, Item 2) from 90° elbow fitting (Figure 5, Item 3) at engine oil pan.

17. Remove engine oil drain hose assembly (Figure 5, Item 2) at 90° elbow fitting (Figure 5, Item 3) at oil pan.
18. Dispose of soiled rags IAW local SOP.

REMOVE/INSTALL 400 HZ ENGINE ASSEMBLY – CONTINUED

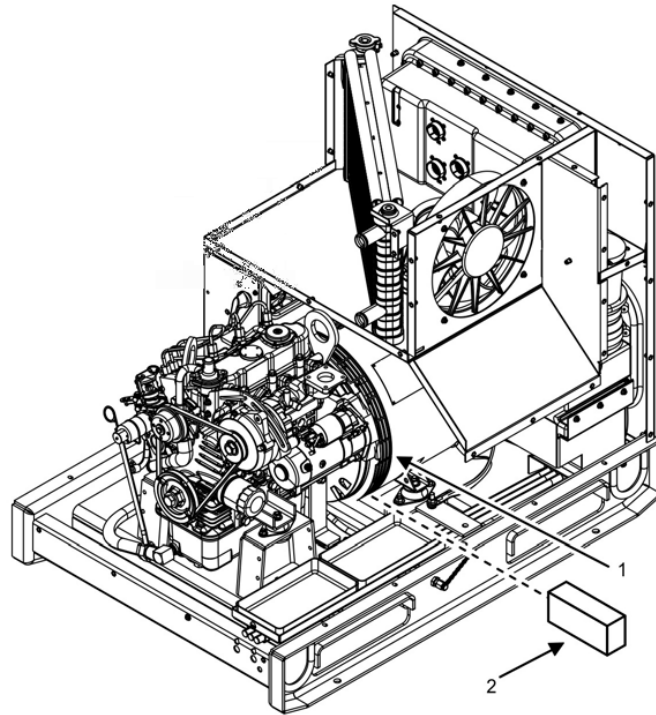


Figure 6. Block AC Generator - Detail.

19. Place blocking (Figure 6, Item 2) under AC generator (Figure 6, Item 1) to keep generator level.

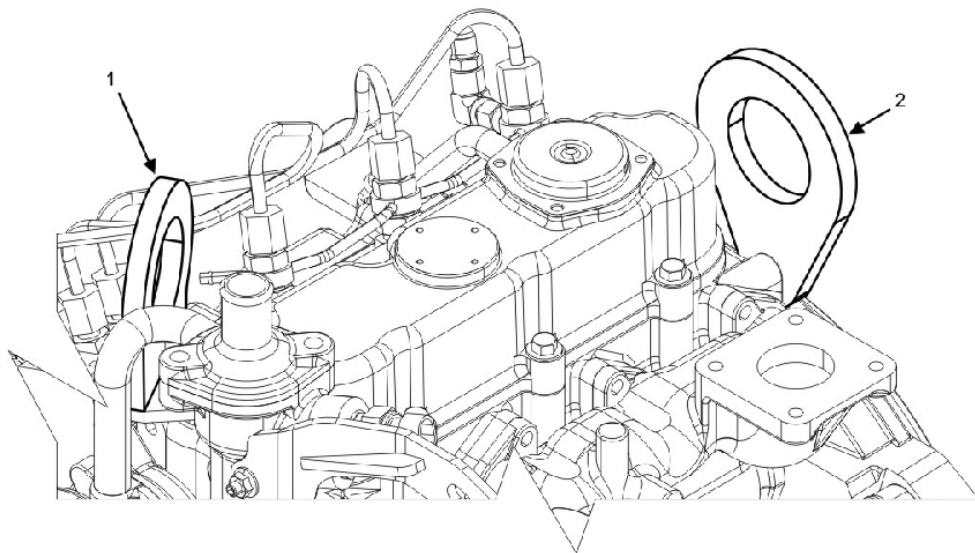


Figure 7. Lifting Eyes - Detail.

REMOVE/INSTALL 400 HZ ENGINE ASSEMBLY – CONTINUED

20. Inspect lifting eyes (Figure 7, Items 1 and 2) for damage and missing or loose attaching hardware (not shown).
21. Replace damaged lifting eyes (Figure 7, Items 1 and 2) and missing hardware (not shown) as required.
22. Torque loose lifting eye hardware (not shown) to 17-21 ft•lb (23-29 N•m) as required.
23. Attach suitable lifting device to lifting eyes (Figure 7, Items 1 and 2) of engine.
24. Raise lifting device to remove slack in chains.

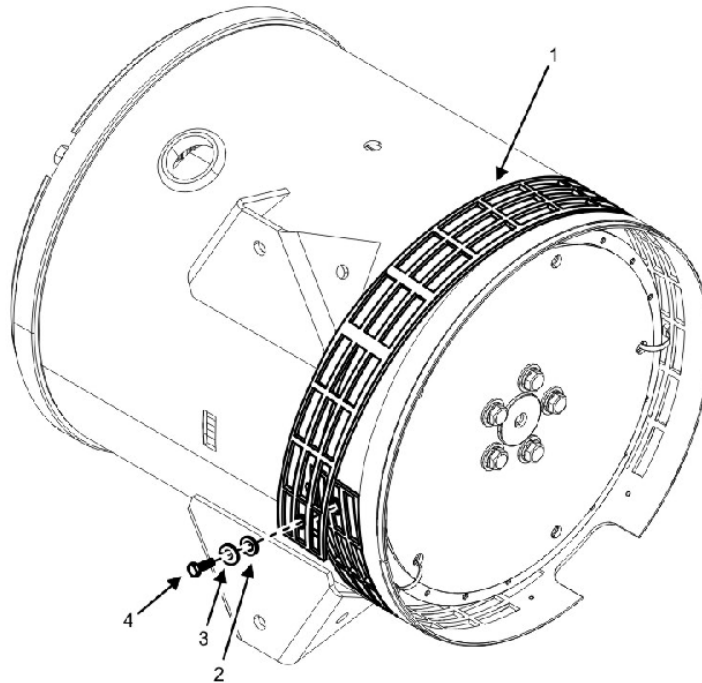


Figure 8. 400 Hz AC Generator Screen - Removal.

25. Remove screw (Figure 8, Item 4), lockwasher (Figure 8, Item 3), and flat washer (Figure 8, Item 2) that secure screen (Figure 8, Item 1) to AC generator. Discard lockwasher (Figure 8, Item 3).
26. Remove screen (Figure 8, Item 1) from AC generator.

REMOVE/INSTALL 400 HZ ENGINE ASSEMBLY – CONTINUED

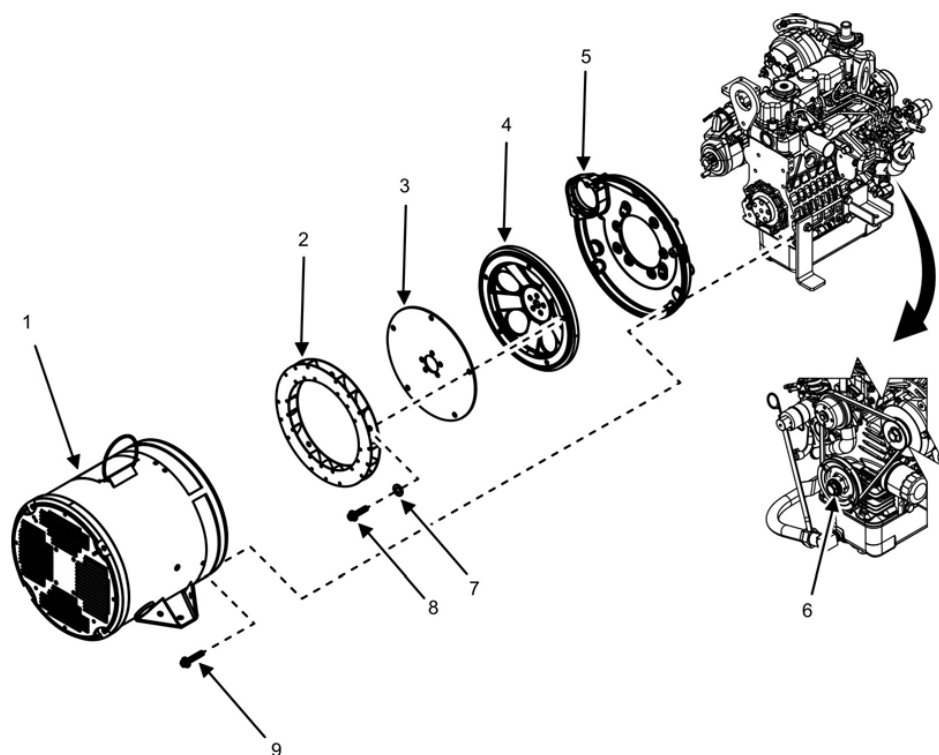


Figure 9. AC Generator Separation, 400 Hz - UOC 98F.

CAUTION

Secure harmonic balancer and do not brace against fan blades during procedure. Failure to comply may cause damage to equipment.

27. Rotate engine harmonic balancer hex capscrew (Figure 9, Item 6) clockwise (viewed from water pump end of engine) using socket and breaker bar to gain access to five screws (Figure 9, Item 8).
28. Remove five screws (Figure 9, Item 8) and five washers (Figure 9, Item 7) securing fan (Figure 9, Item 2) and AC generator drive plate (Figure 9, Item 3) to engine flywheel (Figure 9, Item 4) through opening in AC generator (Figure 9, Item 1) once screen (Figure 8, Item 1) has been removed.
29. Remove four screws (Figure 9, Item 9) that secure AC generator (Figure 9, Item 1) to engine flywheel housing (Figure 9, Item 5).

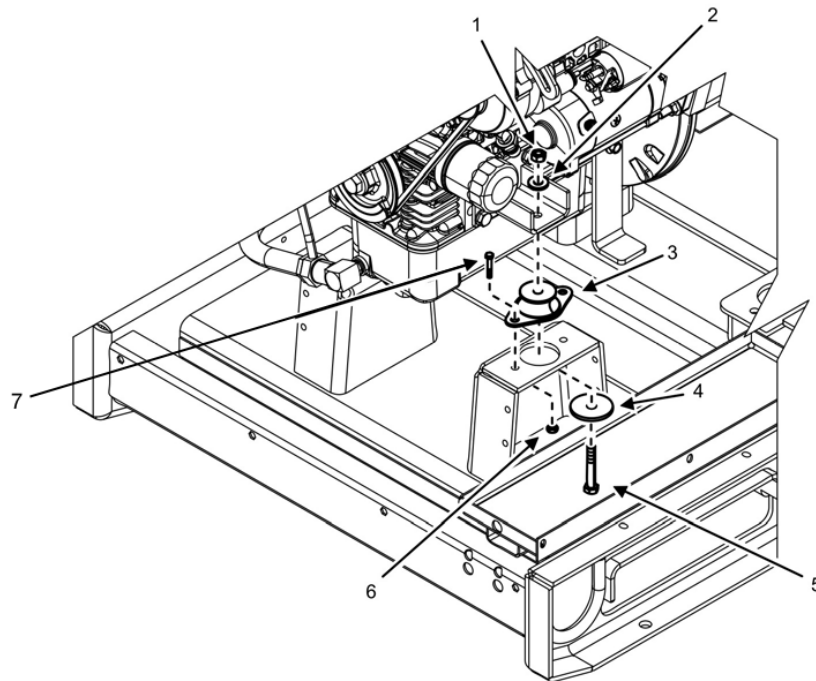
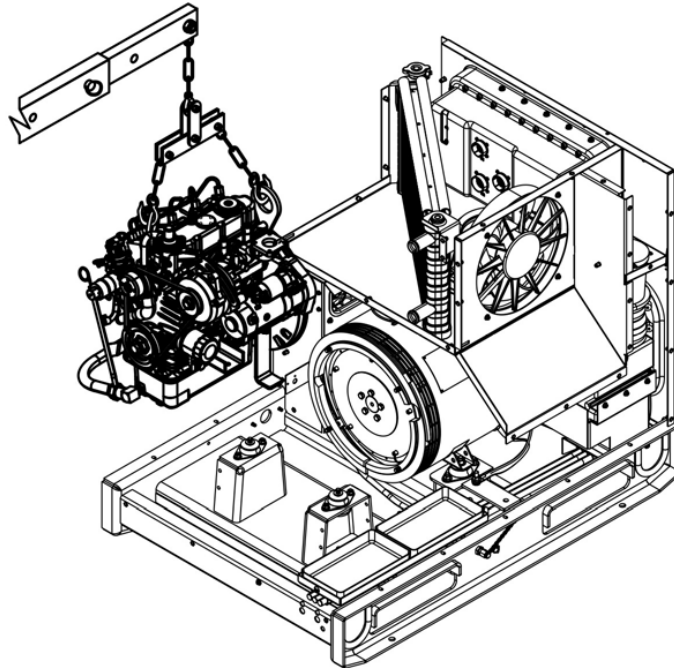
REMOVE/INSTALL 400 HZ ENGINE ASSEMBLY – CONTINUED

Figure 10. Engine Mounts - Removal.

30. Remove engine mounting bolt (Figure 10, Item 5), snubbing washer (Figure 10, Item 4), flat washer (Figure 10, Item 2), and locknut (Figure 10, Item 1) securing engine mount plate to left-side vibration isolator (Figure 10, Item 3). Discard locknut (Figure 10, Item 1).
31. Remove two bolts (Figure 10, Item 7) and locknuts (Figure 10, Item 6) that secure vibration isolator (Figure 10, Item 3) to unit skid. Discard locknuts (Figure 10, Item 6).
32. Remove and discard vibration isolator (Figure 10, Item 3) from unit skid.
33. Repeat Steps 30 through 32 for right-side vibration isolator.

REMOVE/INSTALL 400 HZ ENGINE ASSEMBLY – CONTINUED**Figure 11. Engine - Removal.****WARNING**

When lifting the engine, use lifting equipment with minimum lifting capacity of 500 lb (227 kg). Do not stand or put arms, legs, or any body part under hoisted load. Do not permit engine to swing while hoisted. Failure to comply may cause injury or death to personnel.

34. Lift engine slightly until free of engine mounts using suitable lifting device (Figure 11).

CAUTION

The main rotor of the AC generator (not shown) may remain attached to engine flywheel as engine is lifted. This is a result of galvanic corrosion between dissimilar metals of the engine flywheel and generator drive plate. Do not allow main rotor to be withdrawn from housing when engine is removed. Failure to comply may cause damage to equipment.

NOTE

If main rotor of AC generator (not shown) begins to withdraw from housing as it is pulled from engine, perform Steps 35 and 36 to separate engine and main rotor.

35. Saturate area where engine flywheel (Figure 9, Item 4) and AC generator drive plate (Figure 9, Item 3) are connected with penetrating oil.
36. Allow penetrating oil to soak for 15 min.
37. Using a hammer and brass drift around circumference of engine flywheel (Figure 9, Item 4), strike point of contact between engine flywheel (Figure 9, Item 4) and AC generator drive plate (Figure 9, Item 3) until two components break apart.
38. Pull engine away from AC generator using lifting device (Figure 11).

REMOVE/INSTALL 400 HZ ENGINE ASSEMBLY – CONTINUED

39. Install wire tie to temporarily secure and align mounting holes in AC generator drive plate (Figure 9, Item 3) and fan (Figure 9, Item 2).
40. Secure engine to engine stand or other suitable work surface.
41. Remove lifting device from engine.

END OF TASK**Inspect 400 Hz Engine Assembly**

1. Inspect engine for signs of obvious damage to components.
2. Replace damaged components as required.
3. Inspect all bolts and washers for damage, deterioration, or wear and replace as required.
4. Inspect mounting location on unit skid for damage, corrosion, or cracks. Replace unit skid as required.

Install 400 Hz Engine Assembly

1. Position two new vibration isolators (Figure 10, Item 3) to mounting locations on unit skid and secure to each location by installing two bolts (Figure 10, Item 7) and two new locknuts (Figure 10, Item 6) finger-tight.
2. Torque new locknuts (Figure 10, Item 6) to 18-21 ft•lb (24-29 N•m).
3. Inspect lifting eyes (Figure 7, Items 1 and 2) for damage and missing or loose attaching hardware (not shown).
4. Replace damaged lifting eyes (Figure 7, Items 1 and 2) and missing hardware (not shown) as required.
5. Torque loose lifting eye hardware (not shown) to 17-21 ft•lb (23-29 N•m) as required.
6. Attach suitable lifting device to lifting eyes (Figure 7, Items 1 and 2) of engine.
7. Raise engine assembly using lifting device.
8. Position engine to its approximate mounting location in unit skid.
9. Clean mating surfaces of engine flywheel (Figure 9, Item 4) and AC generator drive plate (Figure 9, Item 3) using a crocus cloth.
10. Apply antiseize compound to mating surfaces of engine flywheel (Figure 9, Item 4) and AC generator drive plate (Figure 9, Item 3) to minimize corrosion of dissimilar metals.
11. Lower engine slowly, using lifting device, until mounting holes on engine mounts align with vibration isolator (Figure 10, Item 3).
12. Insert engine mounting bolts (Figure 10, Item 5) upside-down in engine mount to temporarily secure engine to vibration isolator (Figure 10, Item 3) on unit skid.
13. Align engine assembly with AC generator (Figure 9, Item 1).
14. Align mounting holes between AC generator (Figure 9, Item 1) and engine flywheel housing (Figure 9, Item 5).
15. Install four screws (Figure 9, Item 9) to secure engine flywheel housing (Figure 9, Item 5) to AC generator (Figure 9, Item 1).
16. Remove wire tie temporarily holding AC generator drive plate (Figure 9, Item 3) to fan (Figure 9, Item 2).

NOTE

For ease of installation, temporarily install two or three screws (Figure 9, Item 8) to secure AC generator drive plate (Figure 9, Item 3) and fan (Figure 9, Item 2) to engine flywheel (Figure 9, Item 4) without washers (Figure 9, Item 7). Installation without washers (Figure 9, Item 7) allows easier alignment of the three mounting holes until the

REMOVE/INSTALL 400 HZ ENGINE ASSEMBLY – CONTINUED

assembly is partially complete. Screws (Figure 9, Item 8) installed without washers (Figure 9, Item 7) will be removed and reinstalled with the washers (Figure 9, Item 7) to properly join the three components.

Orient washers (Figure 9, Item 7) with rounded surface facing drive plate (Figure 9, Item 3).

17. Rotate engine harmonic balancer hex capscrew (Figure 9, Item 6) clockwise (as viewed from front of engine) using socket and breaker bar to position a mounting hole in AC generator drive plate (Figure 9, Item 3), fan (Figure 9, Item 2), and engine flywheel (Figure 9, Item 4) near the top of AC generator (Figure 9, Item 1).
18. Align a mounting hole in each of the three components and temporarily secure by installing one screw (Figure 9, Item 8) without a washer (Figure 9, Item 7).
19. Rotate engine harmonic balancer hex capscrew (Figure 9, Item 6) clockwise (as viewed from front of engine) using socket and breaker bar to position another mounting hole in AC generator drive plate (Figure 9, Item 3), fan (Figure 9, Item 2), and engine flywheel (Figure 9, Item 4) near the top of AC generator (Figure 9, Item 1).
20. Install a second screw (Figure 9, Item 8) to secure AC generator drive plate (Figure 9, Item 3) and fan (Figure 9, Item 2) to engine flywheel (Figure 9, Item 4) without a washer (Figure 9, Item 7).
21. Continue to rotate the crankshaft to position remaining three mounting holes near the top of AC generator (Figure 9, Item 1) and install remaining three screws (Figure 9, Item 8) with washers (Figure 9, Item 7).
22. Rotate the engine harmonic balancer hex capscrew (Figure 9, Item 6) to return screws (Figure 9, Item 8) without washers (Figure 9, Item 7) to top of AC generator (Figure 9, Item 1).
23. Remove screw (Figure 9, Item 8) and reinstall screw (Figure 9, Item 8) with washer (Figure 9, Item 7).
24. Repeat Steps 22 and 23 for the remaining screw (Figure 9, Item 8) installed without a washer (Figure 9, Item 7).
25. Torque five screws (Figure 9, Item 8) to 18-21 ft•lb (24-29 N•m).
26. Torque four screws (Figure 9, Item 9) securing engine flywheel housing (Figure 9, Item 5) to AC generator (Figure 9, Item 1) to 42-45 ft•lb (55-61 N•m).
27. Position screen (Figure 8, Item 1) to its mounting location on AC generator (Figure 9, Item 1).
28. Secure screen (Figure 8, Item 1) to AC generator by installing flat washer (Figure 8, Item 2), new lockwasher (Figure 8, Item 3), and screw (Figure 8, Item 4).
29. Remove left-side engine mounting bolt (Figure 10, Item 5) installed upside-down in Step 12.
30. Install snubbing washer (Figure 10, Item 4) to engine mounting bolt (Figure 10, Item 5).
31. Install engine mounting bolt (Figure 10, Item 5) with snubbing washer (Figure 10, Item 4) through unit skid and bottom of vibration isolator (Figure 10, Item 3) on left-side of skid.
32. Install new locknut (Figure 10, Item 1) and flat washer (Figure 10, Item 2) to engine mounting bolt (Figure 10, Item 5) finger-tight to secure engine to skid and vibration isolator (Figure 10, Item 3).
33. Repeat Steps 29 through 32 to install engine mounting bolt (Figure 10, Item 5) to right-side of skid.
34. Torque new locknuts (Figure 10, Item 1) to 39-45 ft•lb (53-65 N•m).
35. Remove blocking (Figure 6, Item 2) from beneath AC generator (Figure 6, Item 1).
36. Remove lifting device from engine.

NOTE

Prior to installation of engine oil drain hose assembly (Figure 5, Item 2), remove all caps/plugs from oil hoses/fittings. Capture spilled engine oil and dispose of IAW local SOP.

REMOVE/INSTALL 400 HZ ENGINE ASSEMBLY – CONTINUED

Two wrenches are needed to install engine oil drain hose assembly (Figure 5, Item 2) and fittings to engine oil pan.

Apply pipe joint compound to threads of fittings before reassembly.

37. Apply pipe joint compound to 90° elbow fitting (Figure 5, Item 3) and install engine oil drain hose assembly (Figure 5, Item 2) to 90° elbow fitting (Figure 5, Item 3) in engine oil pan.
38. Position engine oil drain hose assembly (Figure 5, Item 2) bulkhead fitting (Figure 5, Item 1) to its mounting position on unit skid.
39. Ensure oil drain hose assembly (Figure 5, Item 2) lies flat on unit skid.
40. Secure bulkhead fitting (Figure 5, Item 1) to unit skid by installing two hex socket head screws (Figure 5, Item 4).
41. Dispose of soiled rags IAW local SOP.

NOTE

Use tags placed on sensors/senders and wiring harness at removal to assist installation. Leave tags on electrical components until generator set is running properly.

42. Secure electrical connectors at the following locations on exhaust side of engine:
 - a. Electrical connector (Figure 4, Item 2) at engine coolant temperature sensor (Figure 4, Item 1).
 - b. Electrical connector (Figure 4, Item 4) at engine oil pressure sender (Figure 4, Item 3).
43. Install bolt (Figure 3, Item 8), P37 drain wire (Figure 3, Item 9), and loop clamp (Figure 3, Item 1) to engine block. Torque bolt (Figure 3, Item 8) to 35-42 ft•lbs (48-57 N•m).
44. Position wiring for DEAD CRANK SWITCH across rear of engine assembly and position DEAD CRANK SWITCH bracket (Figure 3, Item 7) to its mounting location on interior body panel and align the mounting holes.
45. Secure DEAD CRANK SWITCH bracket (Figure 3, Item 7) to interior body panel by installing screw (Figure 3, Item 6).
46. Secure electrical connectors at the following locations on intake side of engine:
 - a. Electrical connector (Figure 3, Item 4) at engine governor actuator (Figure 3, Item 3).
 - b. Electrical connector (Figure 3, Item 5) at the engine speed sensor (Figure 3, Item 2).

NOTE

Prior to installation, remove all caps/plugs from fuel lines/fittings.

47. Install fuel vent hose (Figure 2, Item 2) to fuel injection overflow tube (Figure 2, Item 1).
48. Install fuel supply hose (Figure 2, Item 4) to fuel injection pump (Figure 2, Item 3).
49. Install starter wiring (WP 0077, Remove/Install Starter).
50. Install battery-charging alternator wiring (WP 0075, Remove/Install Battery-Charging Alternator Assembly).
51. Install winterization kit and mounting bracket (as required) (WP 0025, Remove/Install Winterization Kit Components).
52. Install unit bulkhead (WP 0035, Remove/Install Interior Body Panels).
53. Install exhaust flex pipe (WP 0080, Remove/Install Exhaust Manifold).
54. Install muffler (WP 0081, Remove/Install Muffler).
55. Install right-side body panel (WP 0032, Remove/Install Right-Side Body Panel).

REMOVE/INSTALL 400 HZ ENGINE ASSEMBLY – CONTINUED

56. Install left-side body panel (WP 0031, Remove/Install Left-Side Body Panel).
57. Install front body panel (WP 0029, Remove/Install Front Body Panel).
58. Install fuel filter/water separator (WP 0042, Remove/Install Fuel Filter/Water Separator Assembly).
59. Install radiator hoses (WP 0024, Remove/Install Radiator Hose and Tube Assemblies).
60. Install top body panel (WP 0028, Remove/Install Top Body Panel).
61. Fill engine oil (WP 0066, Service Lubrication System).
62. Fill coolant (WP 0021, Service Cooling System).
63. Fill fuel tank (WP 0039, Service Fuel System).
64. Install batteries (WP 0036, Remove/Install Batteries).
65. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
66. Start engine and check for proper operation and fluid leaks. Bring coolant to normal operating temperature and then apply a 100% rated load for 30 minutes (TM 9-6115-749-10).
67. Repair as required.
68. Turn engine control switch to OFF (TM 9-6115-749-10).
69. Remove all temporary identification tags/markings from electrical components.
70. Ensure oil and coolant levels are at proper operating level (TM 9-6115-749-10).

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

SERVICE LUBRICATION SYSTEM

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
 Wrench, Oil Filter, Strap (WP 0162, Table 2, Item 38)

Personnel Required

91D (1)

References

MIL-PRF-2104H
 MIL-PRF-46167D NOTICE 1
 WP 0029, Remove/Install Front Body Panel
 WP 0036, Remove/Install Batteries

Materials/Parts

Filter, engine oil (1) (WP 0124, Item 5)
 Cap set, protective (WP 0163, Table 1, Item 8)
 Lubricating oil, engine (WP 0163, Table 1, Item 23)
 Lubricating oil, engine (WP 0163, Table 1, Item 24)
 Lubricating oil, engine (WP 0163, Table 1, Item 25)
 Rag, wiping (WP 0163, Table 1, Item 31)
 Sealant (WP 0163, Table 1, Item 32)
 Tag, marker (WP 0163, Table 1, Item 35)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool

SERVICE LUBRICATION SYSTEM**WARNING**

Hearing protection is required during maintenance or repair with engine running. Failure to comply can cause hearing loss.

WARNING

When operating, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow engine to cool before checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.

WARNING

Exhaust discharge contains deadly gases, including carbon monoxide. Exhaust gases are most dangerous in places with poor ventilation. Do not operate generator set in an enclosed area unless exhaust discharge is properly vented. Failure to comply may cause injury or death to personnel.

WARNING

High voltage is produced when generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Do not ground yourself in standing water. Never attempt to connect or disconnect load cables while the generator sets are running. Failure to comply may cause injury or death to personnel.

SERVICE LUBRICATION SYSTEM – CONTINUED**CAUTION**

Operating generator set with doors open or with panels removed for an extended length of time will cause engine to overheat. Do not operate generator with doors open or panels removed for longer than necessary to complete your task. Monitor DCS temperature indicator to prevent engine overheating. Failure to comply will cause damage to equipment.

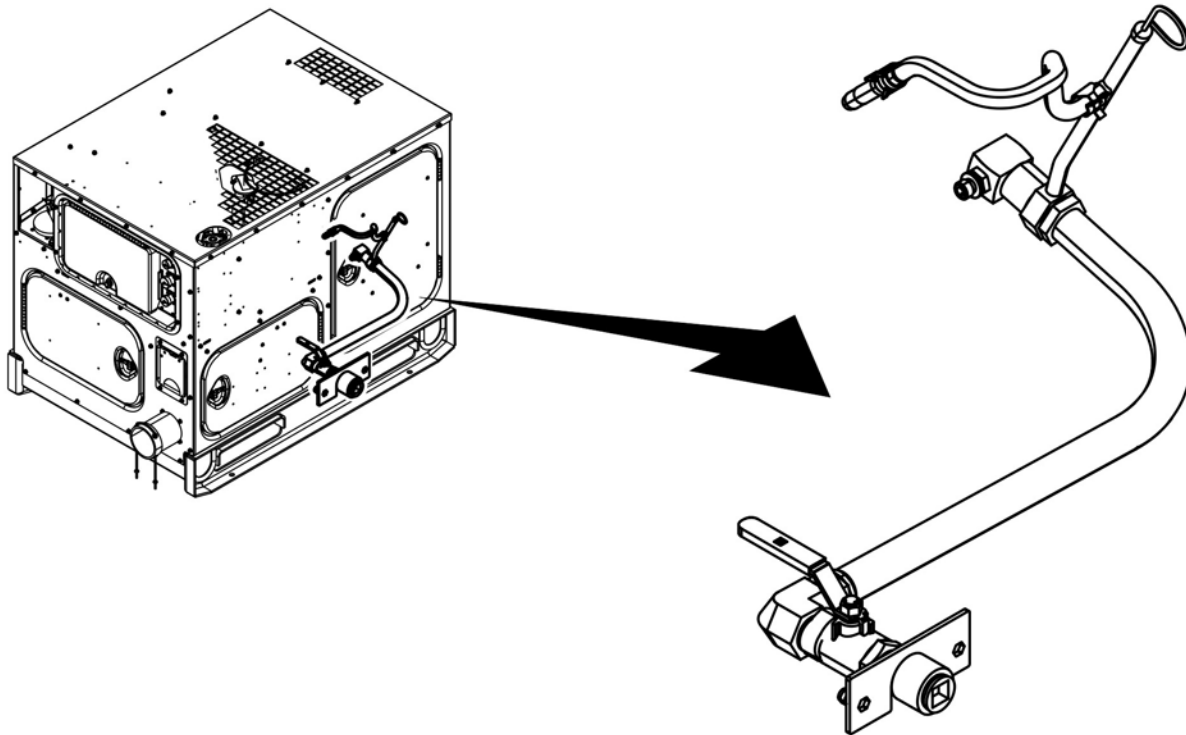
Remove Oil Drain Hose Assembly

Figure 1. Oil Drain Hose Assembly - Location.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Drain engine oil. See Drain Engine Oil and Remove Oil Filter tasks.
3. Ensure plug (Figure 2, Item 9) has been installed into bulkhead fitting (Figure 2, Item 11) after oil has been drained.
4. Open right-side door of generator set.
5. Locate engine oil drain hose assembly (Figure 1).

SERVICE LUBRICATION SYSTEM – CONTINUED

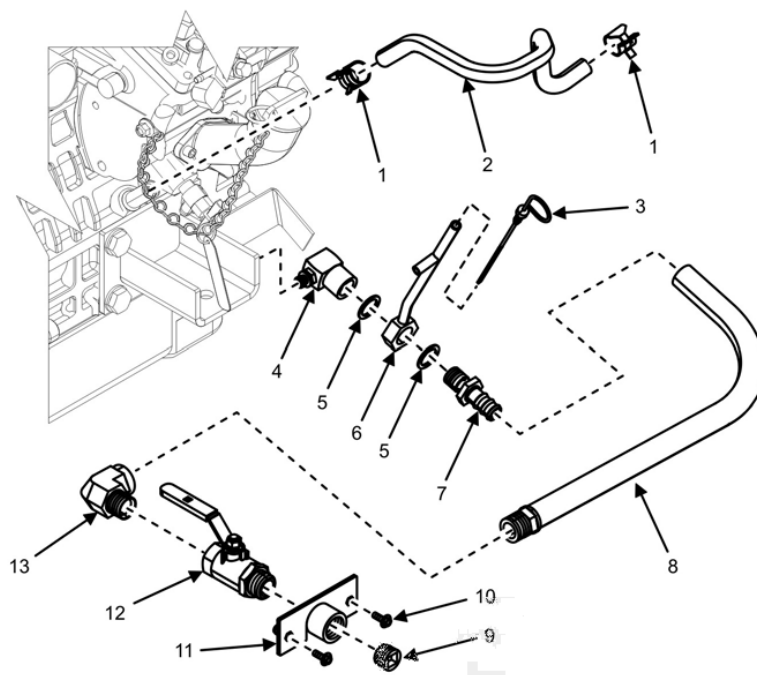


Figure 2. Oil Drain Hose - Detail.

NOTE

Ensure ball valve (Figure 2, Item 12) is in closed position (handle is perpendicular to valve).

Capture and dispose of spilled engine oil and soiled rags IAW local SOP.

6. Place wiping rags under oil drain hose assembly to capture spilled, residual oil.
7. Reposition breather hose clamp (Figure 2, Item 1) at nipple on dipstick tube (Figure 2, Item 6).
8. Remove breather hose (Figure 2, Item 2) from nipple at dipstick tube (Figure 2, Item 6).
9. Remove bulkhead fitting (Figure 2, Item 11) from unit skid by removing two screws (Figure 2, Item 10).

NOTE

Two wrenches will be required to separate the banjo adapter (Figure 2, Item 7) and elbow (Figure 2, Item 4). Capture and dispose of spilled engine oil and soiled rags IAW local SOP.

10. Disconnect banjo adapter (Figure 2, Item 7) from elbow (Figure 2, Item 4) at dipstick tube (Figure 2, Item 6).
11. Remove oil drain hose assembly, dipstick tube (Figure 2, Item 6) with dipstick (Figure 2, Item 3), and two seal washers (Figure 2, Item 5) from unit and place on a suitable work surface. Discard seal washers (Figure 2, Item 5).
12. Remove elbow (Figure 2, Item 4) from engine oil pan.
13. Cap/plug open port in engine oil pan to prevent dirt and contamination from entering engine.

END OF TASK

SERVICE LUBRICATION SYSTEM – CONTINUED**Repair Oil Drain Hose Assembly**

1. Tag all oil drain hose assembly fittings before disassembly.
2. Apply index marks to fittings to aid in reassembly.
3. Disassemble engine oil drain hose assembly into component parts as shown in Figure 2.
 - a. Bulkhead fitting (Figure 2, Item 11)
 - b. Plug (Figure 2, Item 9)
 - c. Screw (Figure 2, Item 10)
 - d. Ball valve (Figure 2, Item 12)
 - e. Elbow (2) (Figure 2, Items 4 and 13)
 - f. Engine oil drain hose (Figure 2, Item 8) attached to banjo adapter (Figure 2, Item 7)
 - g. Breather hose (Figure 2, Item 2)
 - h. Clamp (2) (Figure 2, Item 1)
 - i. Dipstick tube (Figure 2, Item 6) with dipstick (Figure 2, Item 3)
 - j. Seal washer (2) (Figure 2, Item 5)

WARNING

Compound cleaning solvent is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection is required. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply may cause injury or death to personnel.

4. Clean dirt, grease and oil from oil drain hose assembly parts (Figure 2, Items 4, 6, 7, 12, and 13) using compound cleaning solvent and rags being careful not to erase index marks applied during removal.
5. Inspect engine oil drain hose assembly components (Figure 2, Items 4, 6, 7, 12, and 13) for corrosion, damaged fittings, frayed hose, cut hose, or crushed hose.
6. Replace damaged components as required.

NOTE

Apply sealant to threads of all fittings before reassembly.

7. Assemble oil drain hose (Figure 2, Item 8) banjo adapter (Figure 2, Item 7), elbow (Figure 2, Item 13), ball valve (Figure 2, Item 12), drain plug (Figure 2, Item 9), and bulkhead fitting (Figure 2, Item 11) as shown in Figure 2 using index marks applied at removal as a guide.
8. Assemble breather hose (Figure 2, Item 2) and two clamps (Figure 2, Item 1) to dipstick tube (Figure 2, Item 6).

END OF TASK**Install Engine Oil Drain Hose Assembly****NOTE**

Assemble all components of engine oil drain hose assembly finger-tight until entire assembly is installed in unit skid. Once assembly is installed in unit skid and adjusted to lie flat, tighten each fitting individually.

Remove cap/plugs from fittings as required during installation.

SERVICE LUBRICATION SYSTEM – CONTINUED

Apply sealant to threads of elbow (Figure 2, Item 4) and banjo adapter (Figure 2, Item 7) before reassembly.

1. Install elbow (Figure 2, Item 4) to engine oil pan.
2. Connect oil drain hose assembly to elbow (Figure 2, Item 13).
3. Install dipstick tube (Figure 2, Item 6) with dipstick (Figure 2, Item 3) and two new sealing washers (Figure 2, Item 5) to oil drain hose assembly at banjo adapter (Figure 2, Item 7).
4. Connect banjo adapter (Figure 2, Item 7) to elbow (Figure 2, Item 4).
5. Position bulkhead fitting (Figure 2, Item 11) onto unit skid and secure with two screws (Figure 2, Item 10) fingertight.
6. Adjust all components to lie flat on unit skid floor.
7. Ensure ball valve (Figure 2, Item 12) handle can move freely from fully open to fully closed positions.
8. Tighten each fitting in the engine oil drain hose assembly individually while ensuring assembly lies flat on unit skid.
9. Close ball valve (Figure 2, Item 12) (handle is perpendicular to valve.).
10. Fill engine with oil (TM 9-6115-749-10).
11. Dispose of captured oil and soiled rags IAW local SOP.

END OF TASK**Drain Engine Oil and Remove Oil Filter****WARNING**

While inspecting the operation of the generator set, do not inadvertently reach into the generator set. Failure to comply can cause injury or death to personnel.

NOTE

Engine oil filter should always be replaced when the engine oil is changed. Procedure to replace the engine oil filter is incorporated in the Replace Oil Filter and Fill Engine Oil task.

1. Warm engine oil. If engine has not recently been run, start engine and run for 15 min or until unit has reached normal operating temperature (195 °F (90.5 °C)) (TM 9-6115-749-10).
2. Stop engine.

WARNING

Allow engine to cool from normal operating temperature prior to draining engine oil and removing oil filter. Failure to comply may cause injury or death to personnel.

3. Open right- and left-side doors on generator set.
4. Remove access panel (WP 0029, Remove/Install Front Body Panel).

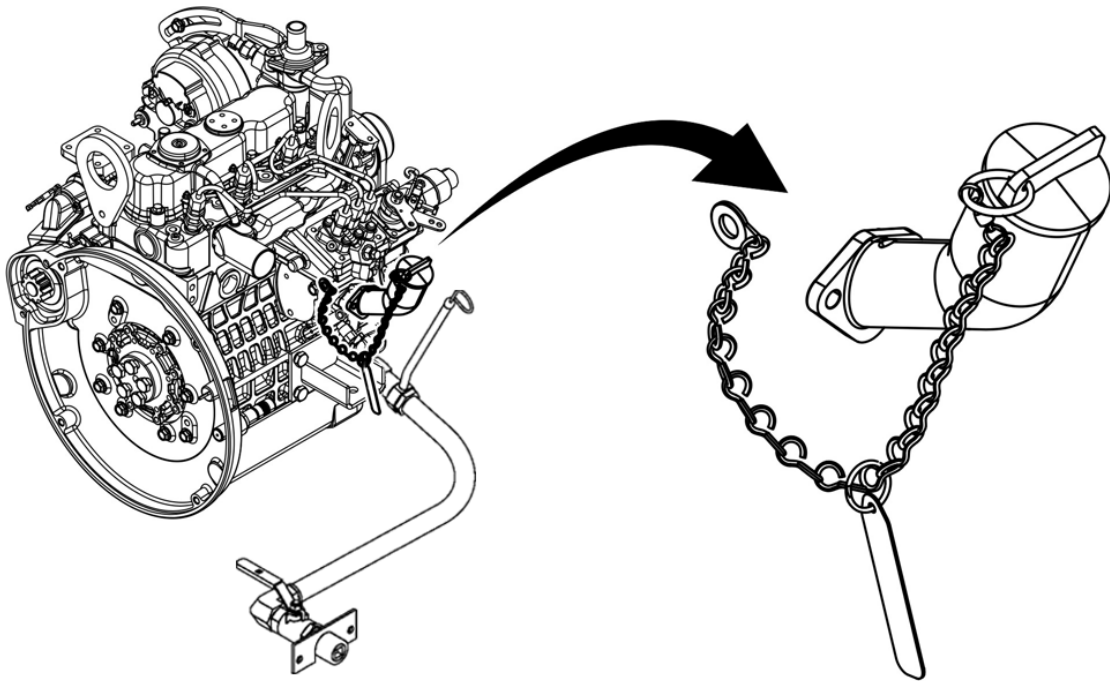
SERVICE LUBRICATION SYSTEM – CONTINUED

Figure 3. Oil Filler - Location.

5. Locate engine oil fill assembly on intake side of engine (Figure 3).

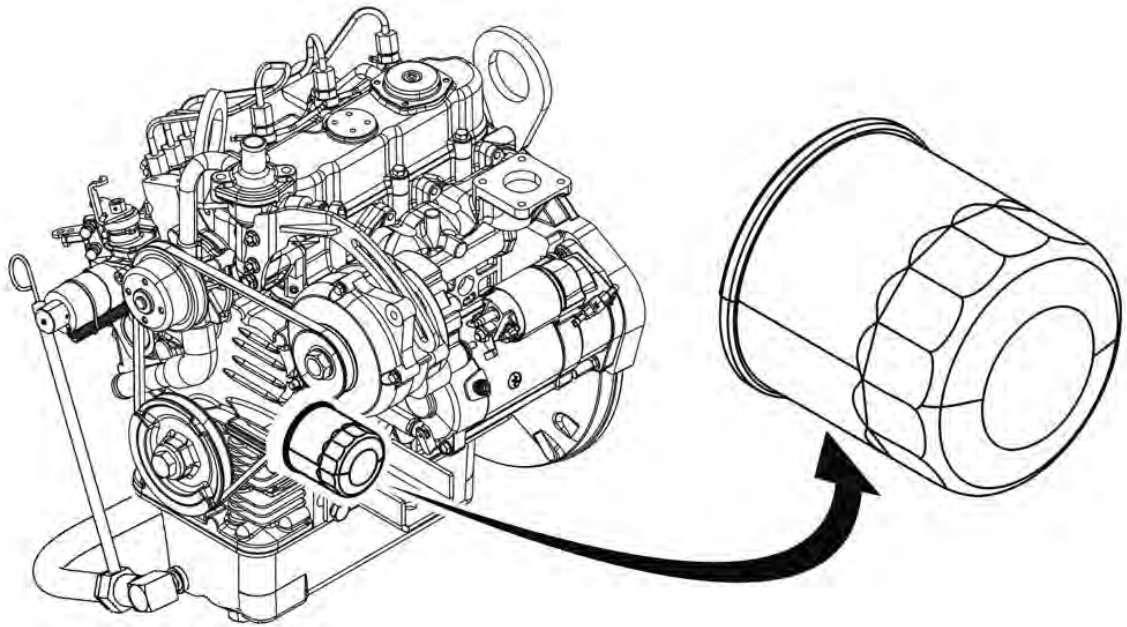
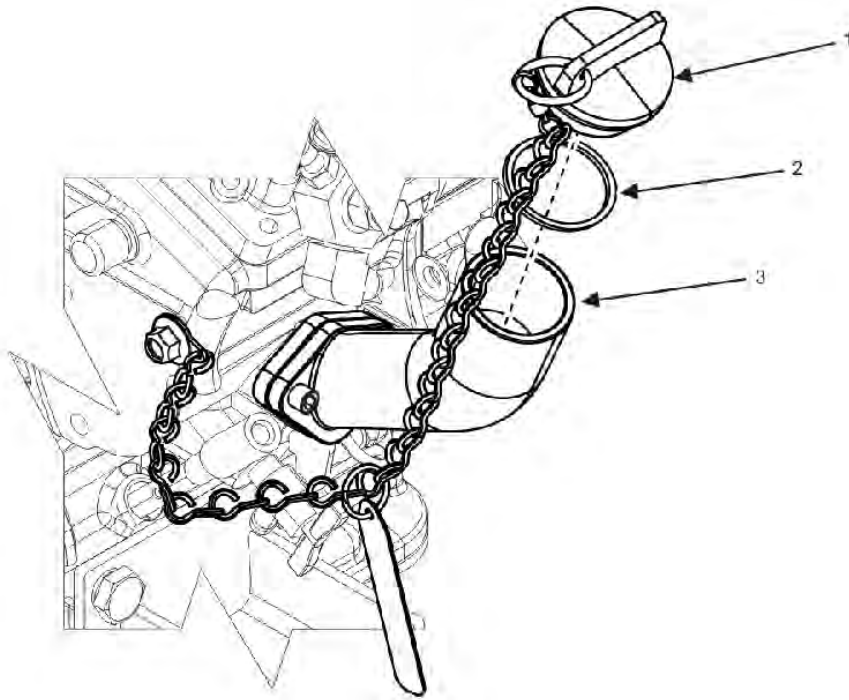
SERVICE LUBRICATION SYSTEM – CONTINUED

Figure 4. Oil Filter - Location.

6. Locate engine oil filter on exhaust side of engine (Figure 4).
7. Remove negative ground cable from right-hand battery (WP 0036, Remove/Install Batteries).

SERVICE LUBRICATION SYSTEM – CONTINUED

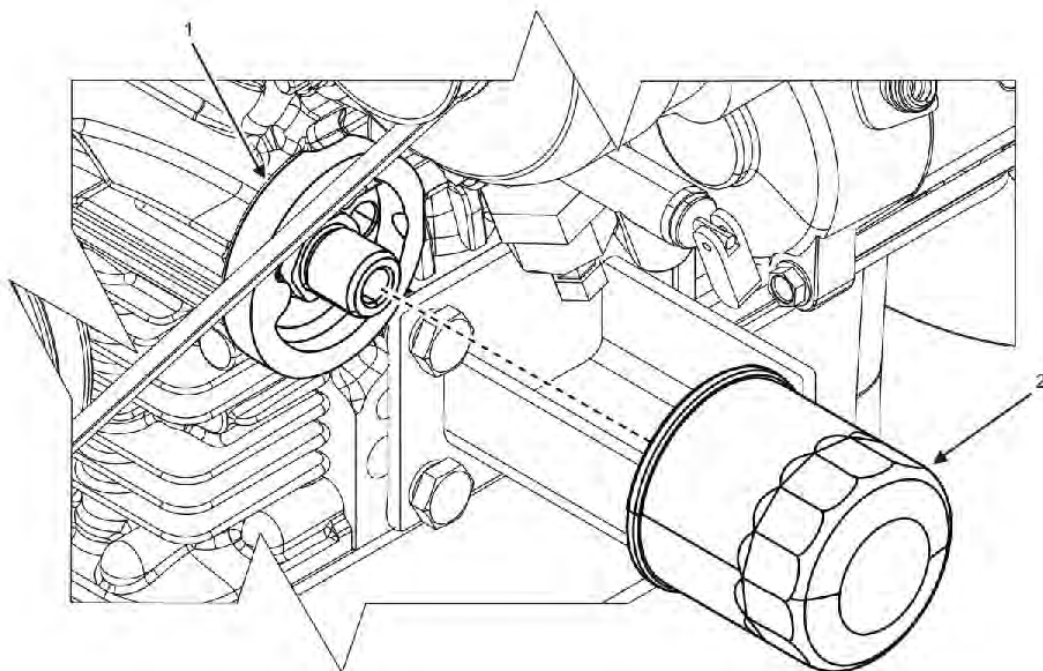
**Figure 5. Oil Filler - Detail.**

8. Remove engine oil filler cap (Figure 5, Item 1) from engine oil fill port (Figure 5, Item 3).
9. Inspect O-ring (Figure 5, Item 2) on oil filler cap (Figure 5, Item 1) for damage. Replace damaged O-ring (Figure 5, Item 2).

NOTE

Capture and dispose of spilled engine oil and soiled rags IAW local SOP.

10. Place a suitable container under engine oil drain plug (Figure 2, Item 9) to capture drained oil.
11. Remove drain plug (Figure 2, Item 9) from bulkhead fitting (Figure 2, Item 11).
12. Install a 6 in, 3/4 in NPT galvanized nipple in bulkhead fitting (Figure 2, Item 11) on right-side of skid.
13. Open ball valve (Figure 2, Item 12) to allow oil to drain into container.
14. Close ball valve (Figure 2, Item 12) when oil flow has stopped.
15. Remove 6 in, 3/4 in NPT galvanized nipple from bulkhead fitting (Figure 2, Item 11) on right-side of skid.
16. Install drain plug (Figure 2, Item 9) in bulkhead fitting (Figure 2, Item 11).

SERVICE LUBRICATION SYSTEM – CONTINUED**Figure 6. Oil Filter - Detail.**

17. Place wiping rag under oil filter (Figure 6, Item 2) to capture residual oil when oil filter (Figure 6, Item 2) is removed.
18. Turn oil filter (Figure 6, Item 2) counterclockwise and remove from engine using oil filter wrench.
19. Place oil filter (Figure 6, Item 2) in oil drain pan to drain.

NOTE

The oil filter gasket is embedded in the groove at the base of the oil filter.

20. Verify that all oil filter gasket was removed from engine with oil filter (Figure 6, Item 2).
21. Remove any remaining oil filter gasket material from oil filter mounting surface (Figure 6, Item 1).

END OF TASK**Replace Oil Filter and Fill Engine Oil**

1. Clean oil filter mounting surface (Figure 6, Item 1) with a clean wiping rag.

NOTE

The oil filter gasket is embedded in the groove at the base of the oil filter.

Choose specification oil based on ambient temperature requirements (Table 1).

2. Apply a thin coat of clean engine lubricating oil (Table 1) to gasket of new oil filter (Figure 6, Item 2).

SERVICE LUBRICATION SYSTEM – CONTINUED**Table 1. Lubricating Oil.**

SPECIFICATION	RATED TEMPERATURE
MIL-PRF-2104H ^a OE/HDO 15/40	5 to 135 °F (-15 to 57 °C)
MIL-PRF-2104H OE/HDO-10	-15 to 5 °F (-26 to -15 °C)
MIL-PRF-46167D NOTICE 1 ^b	-50 to 40 °F (-46 to 4 °C)

^aPerformance Specification, Lubrication Oil, Internal Combustion Engine, Combat/Tactical Service.

^bPerformance Specification, Lubrication Oil, Internal Combustion Engine, Arctic.

3. Install new oil filter (Figure 6, Item 2) to oil filter mounting surface (Figure 6, Item 1) by turning filter clockwise.
4. Continue turning oil filter (Figure 6, Item 2) three-fourths of a turn after gasket has contacted filter mounting surface (Figure 6, Item 1).
5. Install drain plug (Figure 2, Item 9) into bulkhead fitting (Figure 2, Item 11).

CAUTION

Improper engine oil level may cause internal engine failure. If the oil level is too high, engine oil pressure will rise and may result in failure of internal engine oil seals. If the oil level is too low, insufficient pressure may cause failure of internal engine components. Ensure engine oil is at proper level. Failure to comply may cause damage to equipment.

6. Close ball valve (Figure 2, Item 4) if not already closed.

NOTE

The oil capacity of the generator set engine is 3.9 qt (3.7 L).

7. Remove engine oil filler cap (Figure 5, Item 1) from engine.
8. Pour required amount of approved oil (Table 1) into engine at oil fill port (Figure 5, Item 2).
9. Apply a thin film of clean engine oil to o-ring (Figure 5, Item 2) on oil filler cap (Figure 5, Item 1).
10. Install engine oil filler cap (Figure 5, Item 1) to engine.
11. Allow 5 min for engine oil to settle into oil pan and check engine oil level and fill to proper level (TM 9-6115-749-10).
12. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
13. Close right- and left-side doors on generator set.
14. Install access panel (WP 0029, Remove/Install Front Body Panel).
15. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
16. Start engine and run until it reaches normal operating temperature and check for proper operation (TM 9-6115-749-10).
17. Repair as required.
18. Ensure engine lubricating oil is at proper level (TM 9-6115-749-10).

SERVICE LUBRICATION SYSTEM – CONTINUED

19. Dispose of drained oil, used oil filter, and soiled rags IAW local SOP.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE
REMOVE/INSTALL ENGINE SPEED SENSOR

INITIAL SETUP:**Test Equipment**

Load Bank (WP 0162, Table 2, Item 2)

Personnel Required

91D (1)

Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)

Engine cool

Materials/Parts

Sensor, magnetic speed (WP 0125, Item 1)

Battery ground cable removed (WP 0036, Remove/Install Batteries)

REMOVE/INSTALL ENGINE SPEED SENSOR**WARNING**

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

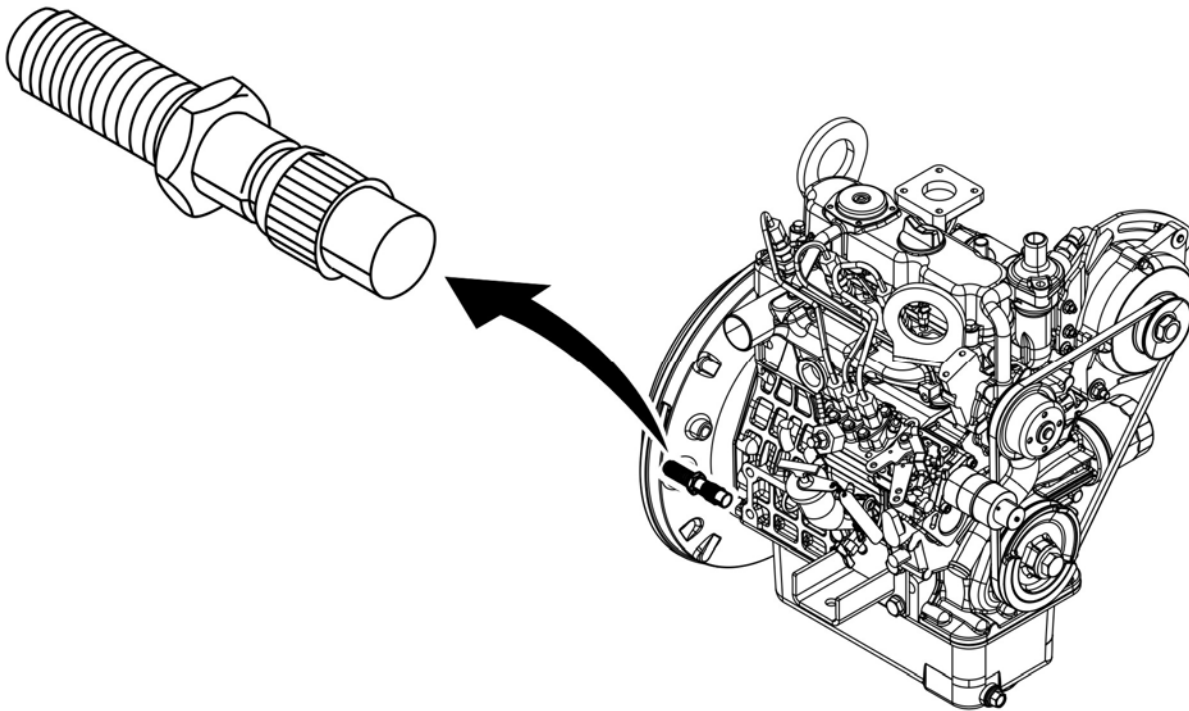
REMOVE/INSTALL ENGINE SPEED SENSOR – CONTINUED**Adjust Engine Speed Sensor**

Figure 1. Engine Speed Sensor - Location.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Open right-side door.
3. Locate engine speed sensor (Figure 1).

REMOVE/INSTALL ENGINE SPEED SENSOR – CONTINUED

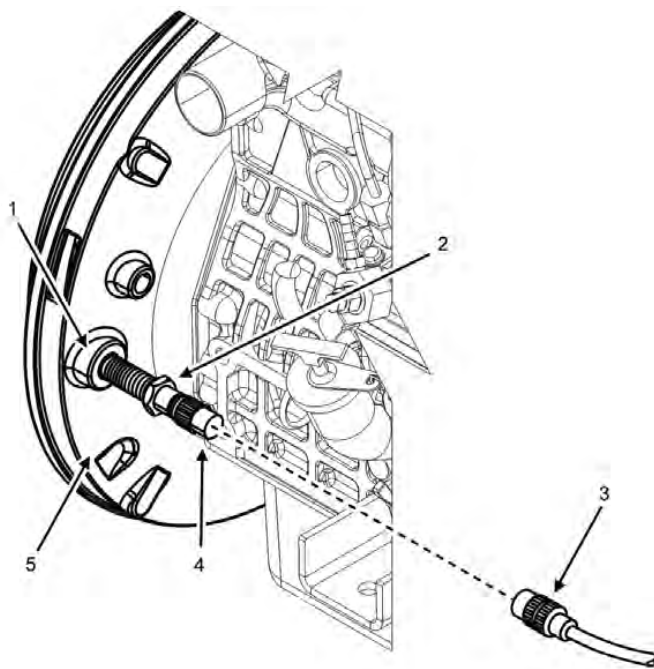


Figure 2. Engine Speed Sensor - Adjust.

CAUTION

Engine speed sensor is a magnetic pickup device. There must be a specific gap between engine speed sensor and flywheel. Engine speed reading will not be transmitted to unit DCS if gap is not within specification, if engine speed sensor is between two teeth, or if engine speed sensor contacts flywheel. Failure to comply will cause damage to equipment.

4. Adjust gap of engine speed sensor (Figure 2, Item 4) as follows:
 - a. Disconnect electrical connector (Figure 2, Item 3) from engine speed sensor (Figure 2, Item 4) if not already disconnected.
 - b. Loosen jamnut (Figure 2, Item 2) that secures engine speed sensor (Figure 2, Item 4) to flywheel housing (Figure 2, Item 5) in engine speed sensor port (Figure 2, Item 1) if not already loose.

CAUTION

Engine speed sensor is very fragile. When adjusting engine speed sensor, turn sensor inward very slowly until engine speed sensor just touches flywheel tooth. Hard contact with the flywheel tooth may cause engine speed sensor to fail. Failure to comply may cause damage to equipment.

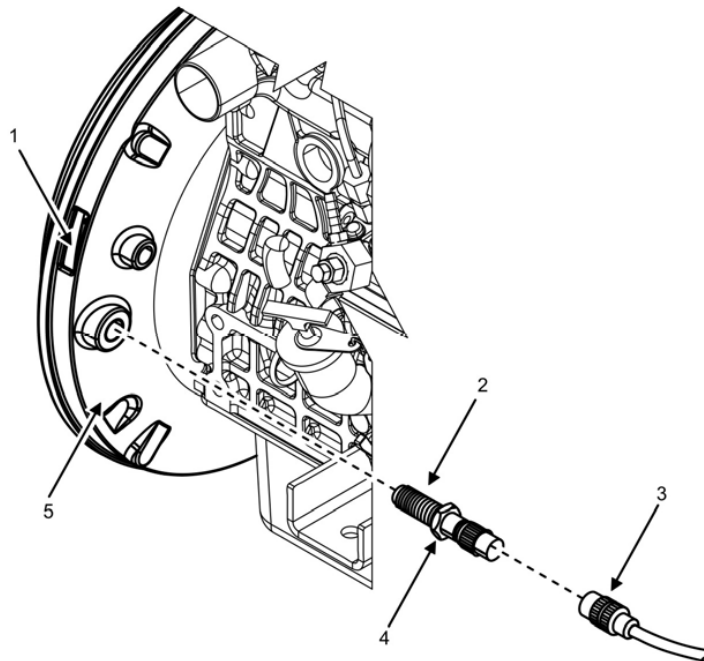
- c. Turn engine speed sensor (Figure 2, Item 4) slowly inward (clockwise) until engine speed sensor (Figure 2, Item 4) just contacts flywheel tooth.
- d. Tighten jamnut (Figure 2, Item 2) until it lightly touches flywheel housing (Figure 2, Item 5).
- e. Turn engine speed sensor (Figure 2, Item 4) (with jamnut (Figure 2, Item 2) attached) outward (counterclockwise) until gap between flywheel housing (Figure 2, Item 5) and jamnut (Figure 2, Item 2) is 0.032-0.035 in (0.81-0.88 mm).

REMOVE/INSTALL ENGINE SPEED SENSOR – CONTINUED

- f. Tighten jamnut (Figure 2, Item 2) firmly against flywheel housing (Figure 2, Item 5) while holding the engine speed sensor (Figure 2, Item 4) stationary to maintain the correct gap.
 - g. Connect electrical connector (Figure 2, Item 3) to engine speed sensor (Figure 2, Item 4).
5. Install battery ground cable (WP 0036, Remove/Install Batteries) to right-hand battery.
 6. Close generator set doors.
 7. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
 8. Start engine and check for proper operation.
 9. Repair as required.

END OF TASK**Remove Engine Speed Sensor**

1. Ensure equipment conditions are met in order presented in initial setup.
2. Open right-side door.
3. Locate engine speed sensor (Figure 1).

**Figure 3. Engine Speed Sensor - Removal.**

4. Disconnect electrical connector (Figure 3, Item 3) at engine speed sensor (Figure 3, Item 2).
5. Loosen jamnut (Figure 3, Item 4) that secures engine speed sensor (Figure 3, Item 2) to flywheel housing (Figure 3, Item 5).
6. Remove engine speed sensor (Figure 3, Item 2) from flywheel housing (Figure 3, Item 5) by turning engine speed sensor (Figure 3, Item 2) counterclockwise.

END OF TASK

REMOVE/INSTALL ENGINE SPEED SENSOR – CONTINUED**Test Engine Speed Sensor**

1. Inspect engine speed sensor (Figure 3, Item 2) for signs of obvious damage.
2. Replace damaged engine speed sensor (Figure 3, Item 2).

END OF TASK**Install Engine Speed Sensor**

1. Position engine speed sensor (Figure 3, Item 2) to its mounting location on intake side of engine at flywheel housing (Figure 3, Item 5).

CAUTION

Engine speed sensor is a magnetic pickup device. There must be a specific gap between engine speed sensor and flywheel. Engine speed reading will not be transmitted to unit DCS if gap is not within specification, if engine speed sensor is between two teeth, or if engine speed sensor contacts flywheel. Failure to comply will cause damage to equipment.

2. Install engine speed sensor (Figure 3, Item 2) into flywheel housing (Figure 3, Item 5) by turning clockwise. Stop installation before engine speed sensor (Figure 3, Item 2) contacts flywheel.
3. Adjust gap between engine speed sensor (Figure 3, Item 2) and flywheel. See Adjust Engine Speed Sensor task.
4. Tighten jamnut (Figure 3, Item 4) on engine speed sensor (Figure 3, Item 2) to lock gap.
5. Connect electrical connector (Figure 3, Item 3) to engine speed sensor (Figure 3, Item 2).
6. Install battery ground cable (WP 0036, Remove/Install Batteries).
7. Close generator set doors.
8. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
9. Start engine and check for proper operation. Bring coolant to normal operating temperature and then apply a 100% rated load for 30 minutes (TM 9-6115-749-10).
10. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
REMOVE/INSTALL GLOW PLUGS

INITIAL SETUP:**Tools and Special Tools**

Socket, Impact Wrench, 3/8 in Dr, 6 Pt, Deep, 10 mm (WP 0162, Table 2, Item 24)
Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
Wrench, Torque, Click, Ratcheting, 3/8 in Drive, 75 ft•lb (WP 0162, Table 2, Item 41)

Materials/Parts

Glow plug (3) (WP 0126, Item 1)
Cap set, protective (WP 0163, Table 1, Item 8)
Grease, electrically conductive (WP 0163, Table 1, Item 20)

Personnel Required

91D (1)
Assistant (1)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)
Top body panel removed (WP 0028, Remove/Install Top Body Panel)

REMOVE/INSTALL GLOW PLUG**WARNING**

Fuel is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash skin and change clothing promptly if in contact with fuel. Failure to comply may cause injury or death to personnel.

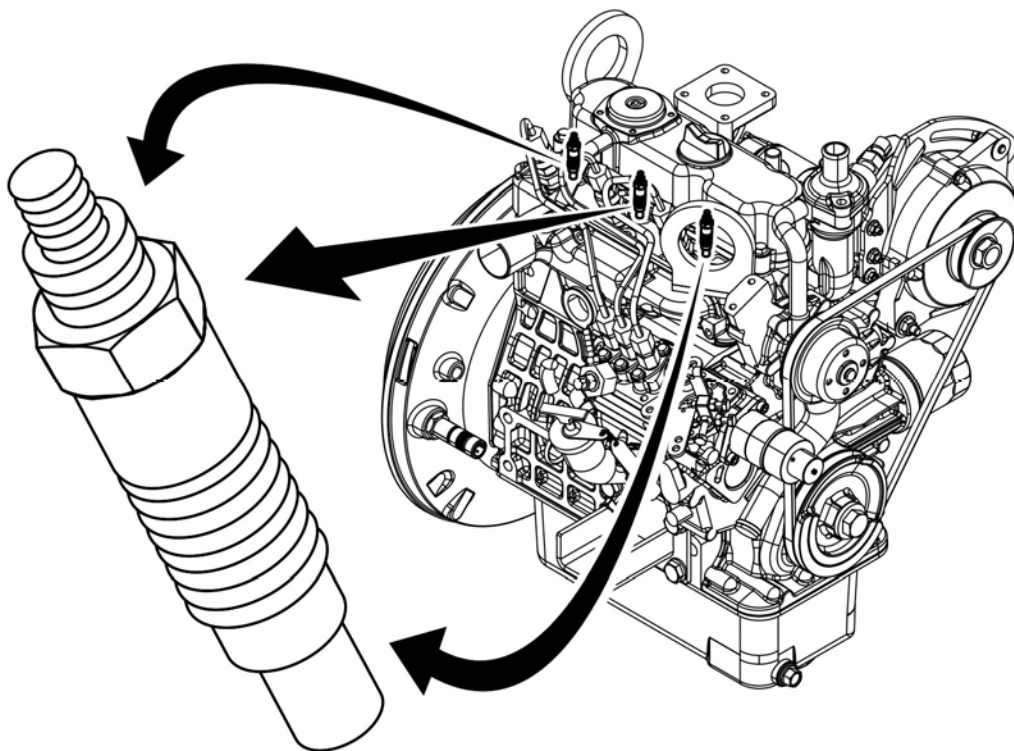
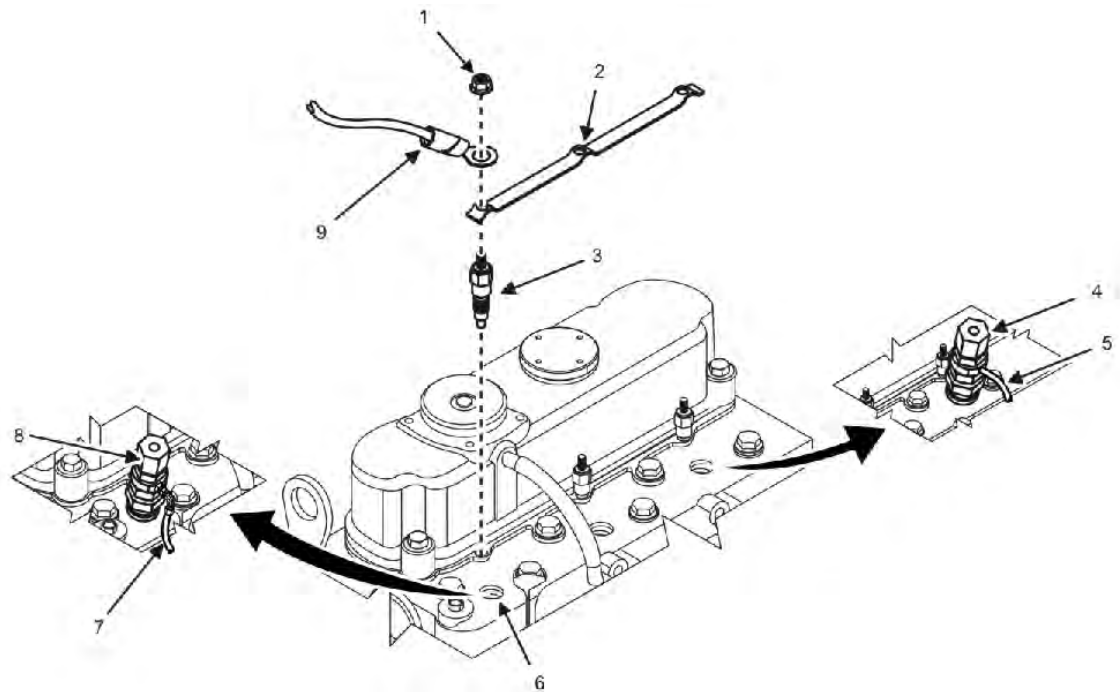
REMOVE/INSTALL GLOW PLUG – CONTINUED**Remove Glow Plug**

Figure 1. Glow Plug - Location.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate glow plugs (Figure 1) on intake side of engine.

NOTE

Several engine parts have been omitted from Figure 2 for the sake of clarity.

REMOVE/INSTALL GLOW PLUG – CONTINUED**Figure 2. Glow Plug - Detail.**

3. Remove nut (Figure 2, Item 1) securing glow plug contact strip (Figure 2, Item 2) and wire lead (Figure 2, Item 9) to number three glow plug (Figure 2, Item 3).
4. Remove wire lead (Figure 2, Item 9) from number three glow plug (Figure 2, Item 3).
5. Remove two nuts (Figure 2, Item 1) securing glow plug contact strip (Figure 2, Item 2) to remaining glow plugs.
6. Remove glow plug contact strip (Figure 2, Item 2) from glow plugs.

NOTE

Access to glow plug does not require removal of fuel return lines if using a 10 mm 3/8-in drive deep well socket. Skip Steps 7 and 8 and proceed to Step 9 as required.

Capture spilled fuel and dispose of IAW local SOP.

Cap/plug all open fuel lines/fittings to prevent dirt and debris from entering the fuel system.

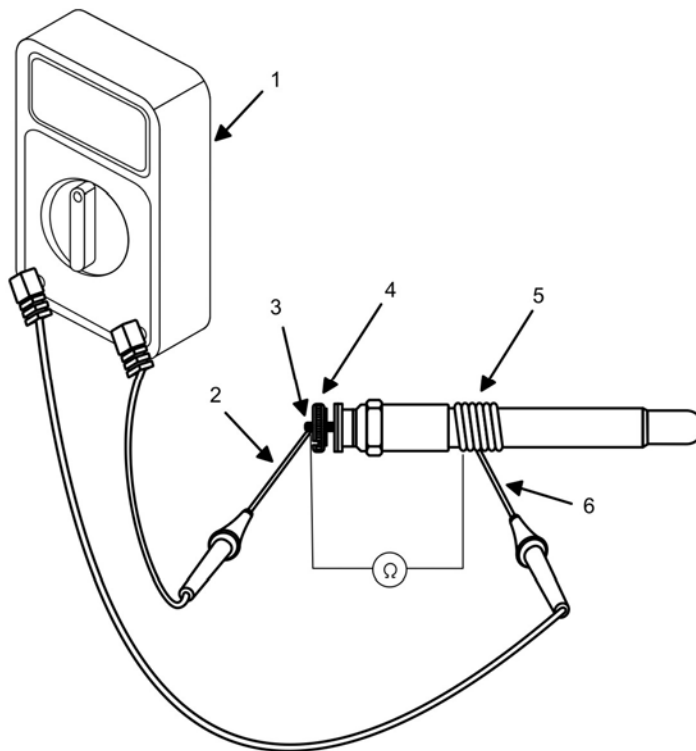
7. Disconnect and cap/plug fuel return line (Figure 2, Item 7) running between number three injector (Figure 2, Item 8) and fuel filter/water separator (not shown) attached to front body panel.
8. Disconnect and cap/plug fuel overflow line (Figure 2, Item 5) running between number one injector (Figure 2, Item 4) and fuel injector pump (not shown).
9. Remove three glow plugs (Figure 2, Item 3) from engine head assembly (Figure 2, Item 6).

END OF TASK**Inspect Glow Plug**

1. Inspect glow plug (Figure 2, Item 3) for damage or corrosion. Repair or replace as required.

REMOVE/INSTALL GLOW PLUG – CONTINUED

2. Inspect glow plug contact strip (Figure 2, Item 2) and all nuts (Figure 2, Item 1) for damage or corrosion. Repair or replace as required.
3. Inspect wire lead (Figure 2, Item 9) for damage or corrosion. Repair or replace as required.
4. Inspect fuel overflow line (Figure 2, Item 5) and fuel return line (Figure 2, Item 7) for damage or corrosion. Repair or replace as required.

END OF TASK**Test Glow Plug****Figure 3. Test Glow Plug.****NOTE**

Ensure that the multimeter probe (Figure 3, Item 2) makes contact with the glow plug terminal (Figure 3, Item 3) and not the glow plug insulator (Figure 3, Item 4).

1. Set multimeter (Figure 3, Item 1) for ohms (Ω) and test on a known connection to verify accuracy.
2. Place one multimeter probe (Figure 3, Item 2) on glow plug terminal (Figure 3, Item 3) and one probe (Figure 3, Item 6) on glow plug chassis (Figure 3, Item 5) to measure resistance.
3. Replace glow plug if resistance (Ω) reading does not meet factory specification of approximately 5 Ω at 77 °F (25 °C).
4. Repeat Steps 1 through 3 for remaining glow plugs.

END OF TASK

REMOVE/INSTALL GLOW PLUG – CONTINUED**Install Glow Plug**

1. Install three glow plugs (Figure 2, Item 3) finger-tight to mounting locations in engine head assembly (Figure 2, Item 6).
2. Torque glow plugs (Figure 2, Item 3) to 6-11 ft•lb (8-15 N•m).
3. Position glow plug contact strip (Figure 2, Item 2) to terminals of three glow plugs (Figure 2, Item 3).
4. Position wire lead (Figure 2, Item 9) on top of number three glow plug (Figure 2, Item 3).
5. Install three nuts (Figure 2, Item 1) to terminals of three glow plugs (Figure 2, Item 3).

NOTE

Access to glow plug does not require removal and installation of fuel return lines if using a 10 mm 3/8-in drive deep well socket. Skip Steps 6 through 9 and proceed to Step 10 as required.

6. Remove plug from fuel return line (Figure 2, Item 7) running between number three injector (Figure 2, Item 8) and fuel filter/water separator (not shown).
7. Install fuel return line (Figure 2, Item 7) to number three injector (Figure 2, Item 8).
8. Remove plug from fuel overflow line (Figure 2, Item 5) running between number one injector (Figure 2, Item 4) and fuel injector pump (not shown).
9. Install fuel overflow line (Figure 2, Item 5) to number one injector (Figure 2, Item 4).
10. Install top body panel (WP 0028, Remove/Install Top Body Panel).
11. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
12. Close generator set doors.
13. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
14. Start engine and check for leaks and proper operation (TM 9-6115-749-10).
15. Dispose of spilled fuel and soiled rags IAW local SOP.
16. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

REMOVE/INSTALL FUEL INJECTOR

INITIAL SETUP:**Test Equipment**

Kit, Nozzle (WP 0162, Table 2, Item 17)
 Tester, Diesel Fuel Injector Nozzle (WP 0162,
 Table 2, Item 30)

Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162,
 Table 2, Item 33)
 Wrench, Torque, Click, Ratcheting, 3/8 in Drive, 75
 ft•lb (WP 0162, Table 2, Item 41)

Materials/Parts

Assembly fuel injector (3) (WP 0127, Item 8)
 Gasket (3) (WP 0127, Item 10)
 Seal, plain encased (3) (WP 0127, Item 11)
 Cap set, protective (WP 0163, Table 1, Item 8)
 Cleaning compound, solvent (WP 0163, Table 1,
 Item 10)
 Fuel, diesel (WP 0163, Table 1, Item 19)
 Grease, electrically conductive (WP 0163, Table
 1, Item 20)

Materials/Parts - cont'd

Rag, wiping (WP 0163, Table 1, Item 31)

Personnel Required

91D (1)
 Assistant (1)

References

WP 0039, Service Fuel System

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP
 0005)
 Engine cool
 Battery ground cable removed (WP 0036, Remove/
 Install Batteries)
 Top body panel removed (WP 0028, Remove/Install
 Top Body Panel)

REMOVE/INSTALL FUEL INJECTOR**WARNING**

Never inject fuel near a fire source. Atomized fuel is highly combustible. Fuel pressure is high enough to penetrate skin. Ensure that spray from the injector nozzle is directed away from all personnel. Direct contact with spray can cause skin cell destruction and blood poisoning. Skin and eye protection are required when working in contact with fuel. Failure to comply may cause injury or death to personnel and damage to equipment.

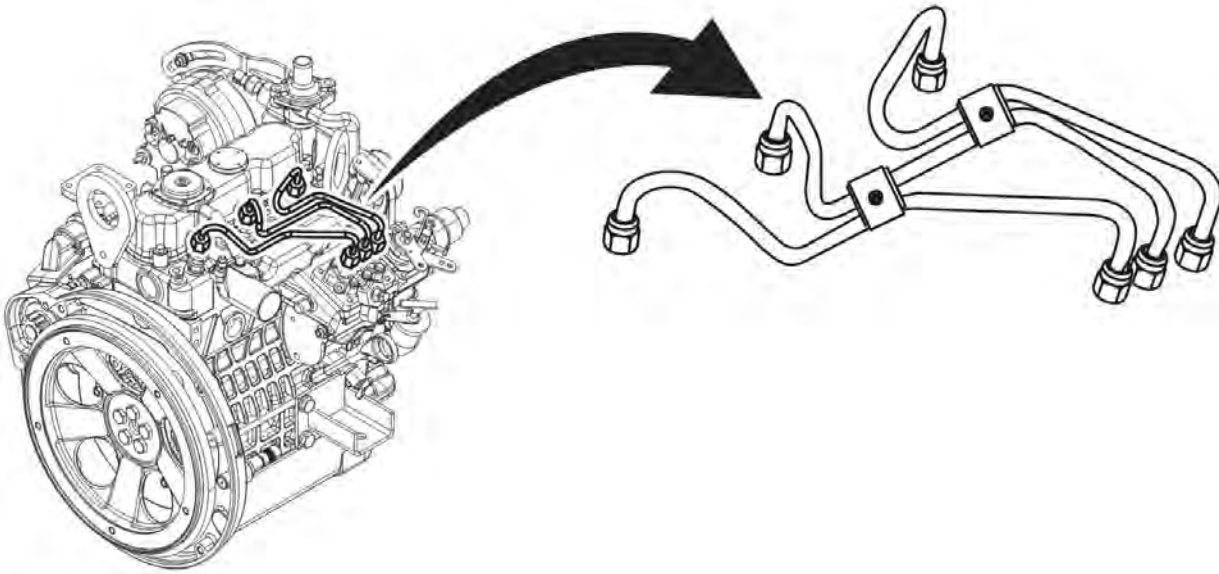
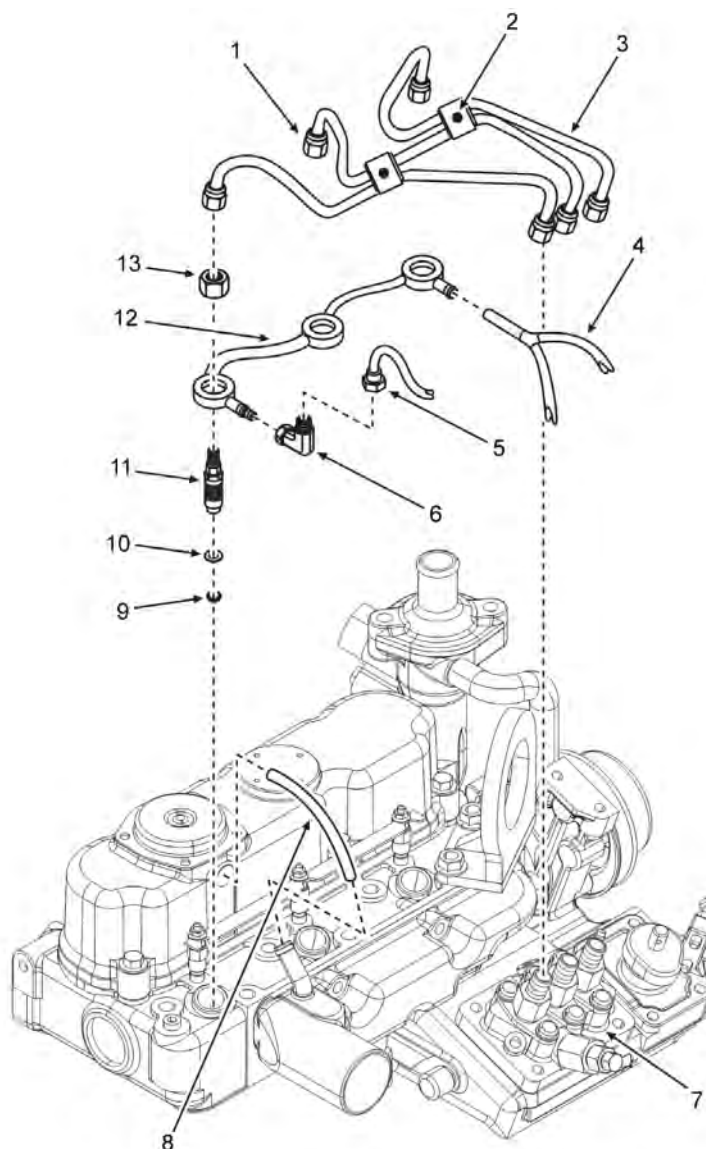
REMOVE/INSTALL FUEL INJECTOR – CONTINUED**Remove Fuel Injector**

Figure 1. Fuel Injector - Location.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Open right-side door on generator set.
3. Locate fuel injectors (Figure 1) on intake side of engine.

REMOVE/INSTALL FUEL INJECTOR – CONTINUED

**Figure 2. Fuel Injector - Detail.**

4. Disengage and loosen screws on two pipe clamps (Figure 2, Item 2) to allow movement of fuel injection lines (Figure 2, Item 3).

WARNING

Fuel is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash exposed skin and change soaked clothing promptly if exposed to fuel. Failure to comply may cause injury or death to personnel.

NOTE

Capture spilled fuel and dispose of soiled rags IAW local SOP.

REMOVE/INSTALL FUEL INJECTOR – CONTINUED

Cap/plug all open fuel lines and fittings to prevent dirt and debris from entering the fuel system.

5. Place a wiping rag under fuel injection lines (Figure 2, Item 3) to capture spilled fuel.
6. Loosen nuts (Figure 2, Item 1) on fuel injection lines (Figure 2, Item 3) from fuel injectors (Figure 2, Item 11).
7. Loosen fuel injection lines (Figure 2, Item 3) from fuel injection pump (Figure 2, Item 7).
8. Remove and tag for identification in sequence from front to rear three fuel injection lines (Figure 2, Item 3) from fuel injectors (Figure 2, Item 11) and fuel injection pump (Figure 2, Item 7).
9. Place fuel injection lines (Figure 2, Item 3) on suitable work surface.
10. Inspect fuel injection lines (Figure 2, Item 3) for damage or corrosion and replace as required.
11. Remove Y-vent tube (Figure 2, Item 4) head section from front overflow tube (Figure 2, Item 12).
12. Remove Y-vent tube (Figure 2, Item 4) feet from fuel injector pump (Figure 2, Item 7) and place on a suitable work surface.
13. Inspect Y-vent tube (Figure 2, Item 4) for damage or excessive wear and replace if damaged or set aside for reuse.
14. Remove fuel return engine line (Figure 2, Item 5) from elbow fitting and adapter (Figure 2, Item 6).
15. Remove elbow fitting and adapter (Figure 2, Item 6) from rear overflow tube (Figure 2, Item 12).
16. Inspect fuel return engine line (Figure 2, Item 5) for damage or excessive wear and replace fuel return engine line if damaged.
17. Remove crankcase vent tube (Figure 2, Item 8) from intake manifold and place on a suitable work surface.
18. Inspect crankcase vent tube (Figure 2, Item 8) for signs of obvious damage. Replace damaged vent tube as required.
19. Remove and set aside three nuts (Figure 2, Item 13) securing overflow tube (Figure 2, Item 12) to three fuel injectors (Figure 2, Item 11).
20. Remove overflow tube (Figure 2, Item 12) from fuel injectors (Figure 2, Item 11) and inspect for damage or excessive wear.
21. Replace overflow tube (Figure 2, Item 12) if damaged or worn or set aside for reuse.

WARNING

Compound cleaning solvent is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection is required. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply may cause injury or death to personnel.

22. Remove any dirt and debris from Y-vent tube (Figure 2, Item 4), overflow tube (Figure 2, Item 12), and fuel injection lines (Figure 2, Item 3) using wiping rags and compound cleaning solvent.
23. Remove three fuel injectors (Figure 2, Item 11) from engine and place on suitable work surface.

NOTE

Use a cross-tip screwdriver with a diameter which is bigger than the heat seal hole or approximately 1/4 in (6 mm) when performing the following steps.

24. Insert screwdriver lightly into fuel injector locations if heat seals (Figure 2, Item 9) and copper gaskets (Figure 2, Item 10) are not removed with fuel injectors (Figure 2, Item 11).
25. Turn screwdriver three or four times to loosen heat seals (Figure 2, Item 9) and copper gaskets (Figure 2, Item 10).

REMOVE/INSTALL FUEL INJECTOR – CONTINUED

26. Pull heat seals (Figure 2, Item 9) and copper gaskets (Figure 2, Item 10) out slowly while turning screw-driver.
27. Discard heat seals (Figure 2, Item 9) and copper gaskets (Figure 2, Item 10).
28. Dispose of captured fuel and soiled wiping rags IAW local SOP.

END OF TASK**Inspect Fuel Injector**

1. Inspect fuel injectors (Figure 2, Item 11) for obvious signs of damage or corrosion.
2. Replace fuel injectors (Figure 2, Item 11) if damaged or corroded.

END OF TASK**Install Fuel Injector**

1. Install new heat seals (Figure 2, Item 9) onto fuel injector mounting locations.
2. Install new copper gaskets (Figure 2, Item 10) into fuel injector mounting locations.
3. Install fuel injectors (Figure 2, Item 11) into mounting locations on engine finger-tight.
4. Torque fuel injectors (Figure 2, Item 11) to 36-51 ft•lb (49-69 N•m).
5. Position overflow tube (Figure 2, Item 12) on fuel injectors (Figure 2, Item 11).
6. Secure overflow tube (Figure 2, Item 12) to fuel injectors (Figure 2, Item 11) by installing three nuts (Figure 2, Item 13).
7. Tighten three nuts (Figure 2, Item 13) to 15-18 ft•lb (20-24 N•m).

NOTE

Remove caps/plugs from fuel lines/fittings prior to installation.

8. Install head of Y-vent tube (Figure 2, Item 4) on front overflow tube (Figure 2, Item 12).
9. Install Y-vent tube (Figure 2, Item 4) foot portions onto fuel injector pump (Figure 2, Item 7).
10. Install elbow fitting and adapter (Figure 2, Item 6) as an assembly to rear overflow tube (Figure 2, Item 12).
11. Install fuel return engine line (Figure 2, Item 5) to elbow fitting and adapter (Figure 2, Item 6).
12. Install crankcase vent tube (Figure 2, Item 8) onto valve cover.
13. Install crankcase vent tube (Figure 2, Item 8) to intake manifold.
14. Position fuel injection lines (Figure 2, Item 3) to their mounting locations at each fuel injector (Figure 2, Item 11) using tags applied during removal as a guide.
15. Finger-tighten each fuel injection line to fuel injector (Figure 2, Item 11).
16. Position fuel injection lines (Figure 2, Item 3) on the fuel injection pump (Figure 2, Item 7) using tags applied during removal as a guide.

CAUTION

Center nut on fuel line/fuel pump mounting must be installed and tightened before other nuts can be installed. If outside nuts are installed, center nut cannot be accessed with a wrench. Failure to comply may cause damage to equipment.

17. Finger-tighten each line-to-pump nut.

REMOVE/INSTALL FUEL INJECTOR – CONTINUED

18. Tighten injection line nuts at injectors (Figure 2, Item 11) uniformly at fuel pump (Figure 2, Item 7).
19. Tighten two pipe clamps (Figure 2, Item 2) to their mounting locations on fuel injection lines (Figure 2, Item 3).
20. Purge fuel system (WP 0039, Service Fuel System).
21. Install top body panel (WP 0028, Remove/Install Top Body Panel).
22. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
23. Close generator set doors.
24. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
25. Start engine and check for proper operation (TM 9-6115-749-10). Bring coolant to normal operating temperature and then apply a 100% rated load for 30 min (TM 9-6115-749-10).
26. Repair as required.
27. Check fuel level and fill as required (TM 9-6115-749-10).

END OF TASK**Test Fuel Injector Spray Pattern****NOTE**

Fluids used for fuel injection nozzle testing should be captured and disposed of IAW local SOP.

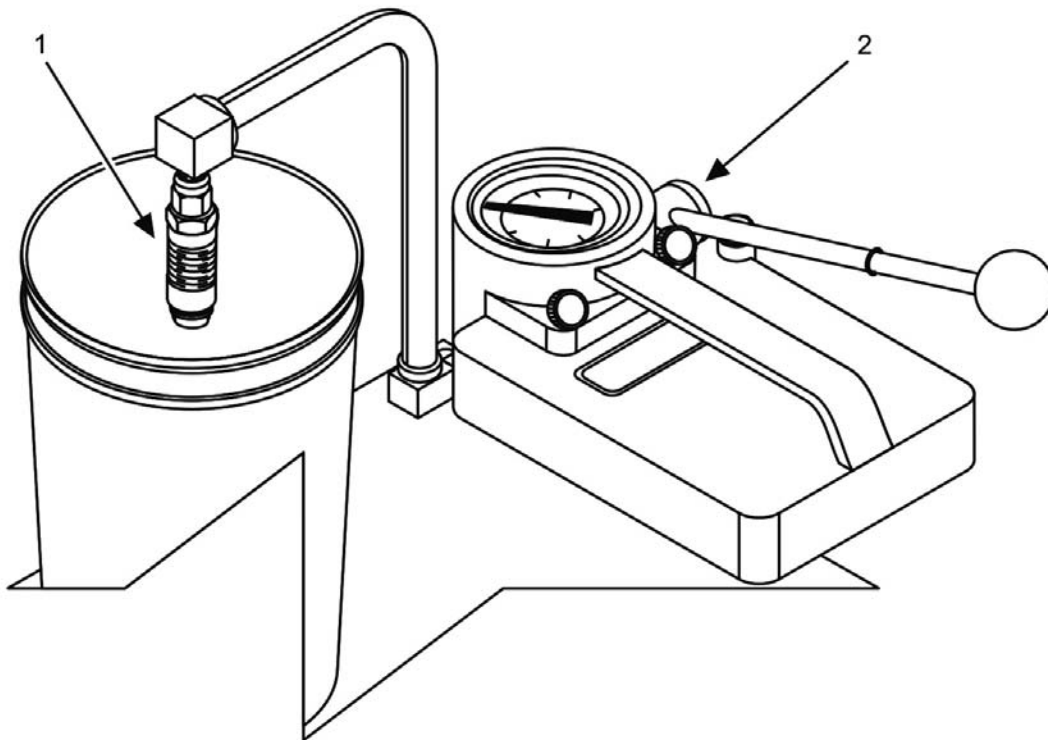


Figure 3. Test Fuel Injector Spray Pattern.

1. Place fuel injector (Figure 3, Item 1) on nozzle tester (Figure 3, Item 2).

REMOVE/INSTALL FUEL INJECTOR – CONTINUED

2. Pump nozzle tester handle slowly to increase pressure until fuel injector (Figure 3, Item 1) is fully open.

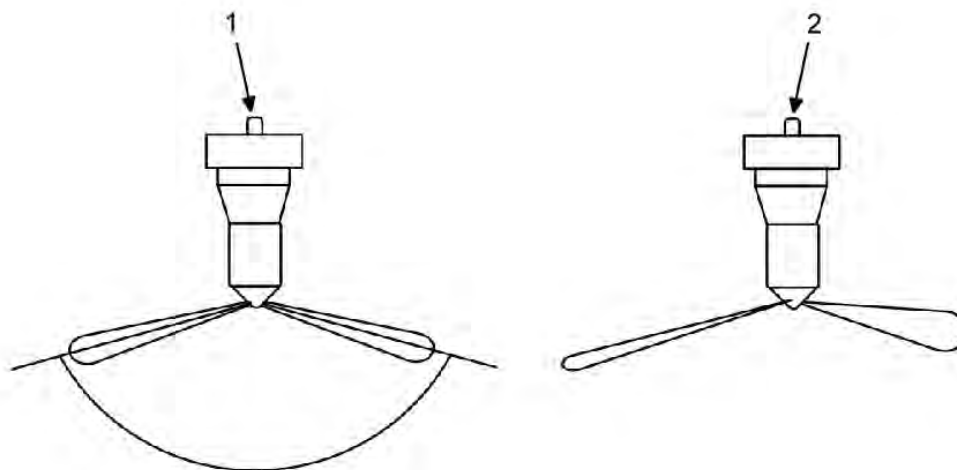


Figure 4. Nozzle Spray Patterns.

NOTE

Fluids used during fuel injection nozzle testing should be captured and disposed of IAW local SOP.

3. Ensure spray is evenly distributed in a fan-shaped pattern across entire spray area (Figure 4, Item 1).
4. Replace fuel injector (Figure 3, Item 1) if spray pattern is defective (Figure 4, Item 2).
5. Dispose of fuel IAW local SOP.

END OF TASK**Test Fuel Injector Pressure**

1. Place fuel injector (Figure 3, Item 1) on nozzle tester (Figure 3, Item 2).
2. Pump nozzle tester handle slowly to increase pressure until fuel injector (Figure 3, Item 1) is fully open.
3. Determine spray pressure by reading pressure gauge on nozzle tester (Figure 3, Item 2).
4. Fuel injector should be fully open between 1,991-2,134 psi (13.7-14.7 MPa).
5. Replace fuel injector (Figure 3, Item 1) if pressure does not meet specification when fully open.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
REMOVE/INSTALL SPEED CONTROL PLATE

INITIAL SETUP:**Tools and Special Tools**

Pick, Dental (WP 0162, Table 2, Item 19)
Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Materials/Parts

Assembly, speed control plate (1) (WP 0128, Item 3)
Bolt (2) (WP 0128, Item 2)
Bolt, machine (2) (WP 0128, Item 1)
Gasket (WP 0128, Item 15)
Cap set, protective (WP 0163, Table 1, Item 8)
Grease, electrically conductive (WP 0163, Table 1, Item 20)
Rag, wiping (WP 0163, Table 1, Item 31)

Personnel Required

91D (1)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)
Remove governor actuator (WP 0078, Remove/Install Governor Actuator)

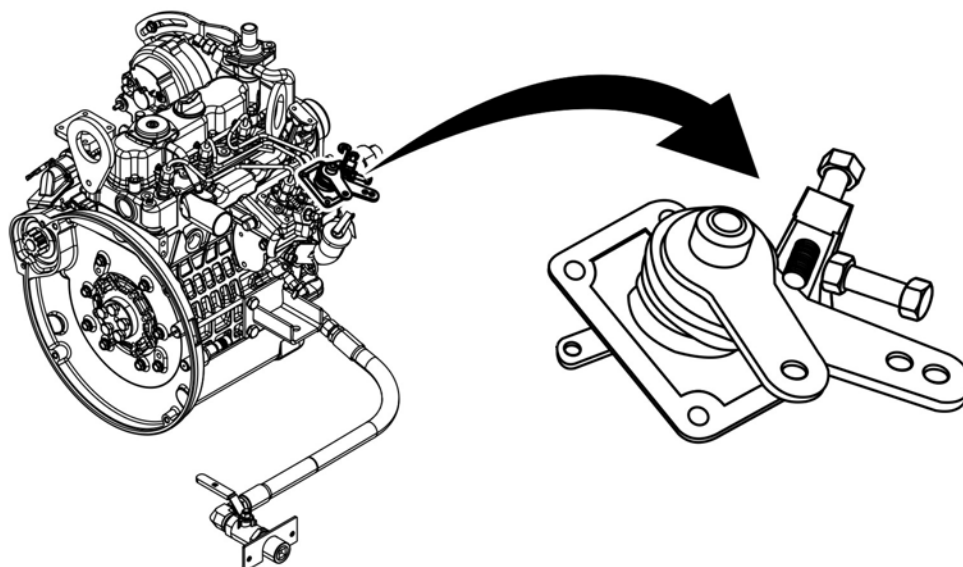
REMOVE/INSTALL SPEED CONTROL PLATE**Remove Speed Control Plate**

Figure 1. Speed Control Plate - Location.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Open right-side door of generator set.
3. Locate speed control plate (Figure 1).

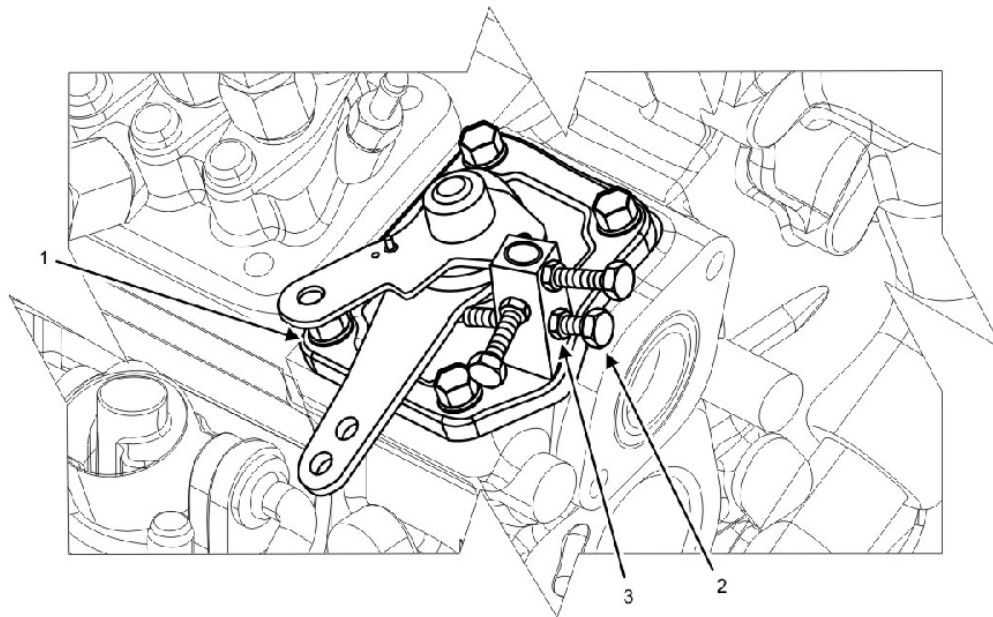
REMOVE/INSTALL SPEED CONTROL PLATE – CONTINUED

Figure 2. Speed Control Plate - Lever Adjustment.

4. Loosen locking nut (Figure 2, Item 3) on lever stop screw (Figure 2, Item 2).
5. Turn lever stop screw (Figure 2, Item 2) six complete turns counterclockwise to gain access to speed control plate mounting screw (Figure 2, Item 1).
6. Secure locking nut (Figure 2, Item 3) on lever stop screw (Figure 2, Item 2).

REMOVE/INSTALL SPEED CONTROL PLATE – CONTINUED

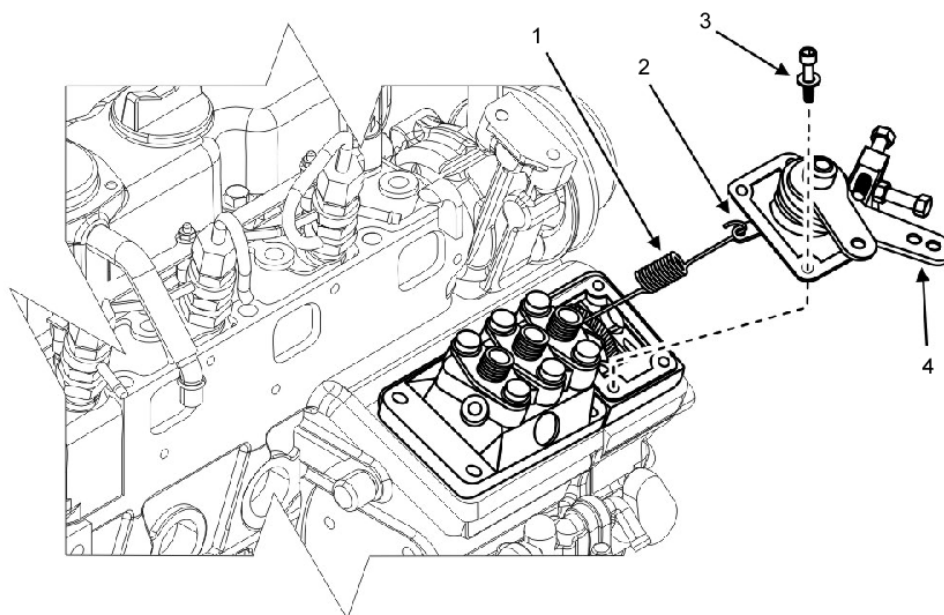


Figure 3. Speed Control Plate - Spring Removal.

7. Remove and discard four screws with lockwashers (Figure 3, Item 3).

CAUTION

Governor control spring may be permanently stretched if speed control plate is lifted too far from engine with spring still attached. Disconnect governor control spring prior to removing speed control plate from engine. Failure to comply may cause damage to equipment.

8. Lift speed control plate (Figure 3, Item 4) from engine high enough to disconnect governor control spring (Figure 3, Item 1).
9. Disconnect governor control spring (Figure 3, Item 1) from speed control plate lever (Figure 3, Item 2) using a dental pick.
10. Allow other end of governor control spring (Figure 3, Item 1) to remain attached to engine.

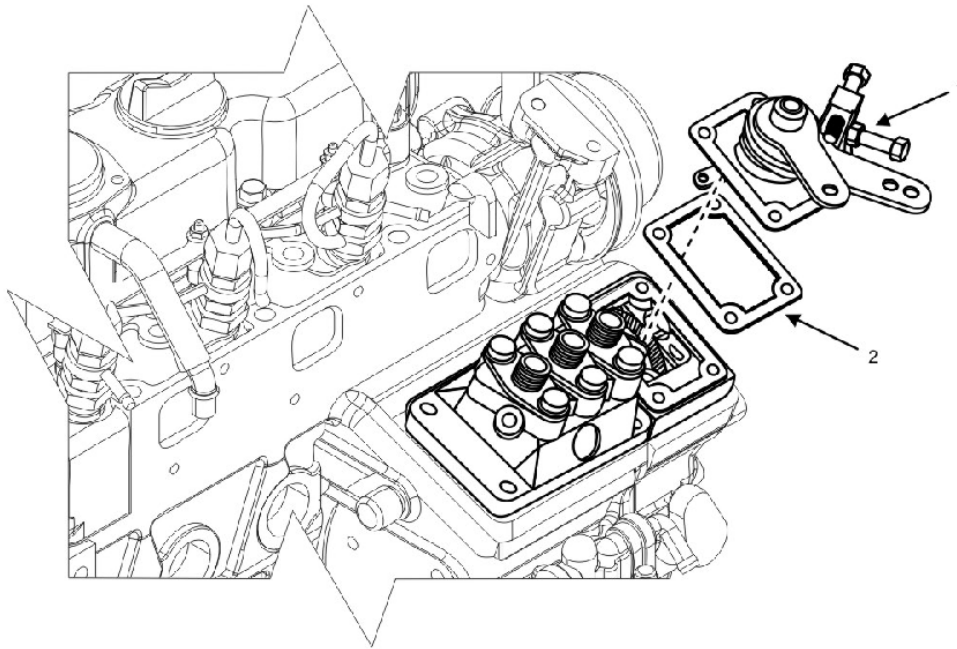
REMOVE/INSTALL SPEED CONTROL PLATE – CONTINUED

Figure 4. Speed Control Plate - Removal.

11. Remove speed control plate (Figure 4, Item 1) from engine.
12. Remove and discard gasket (Figure 4, Item 2) from beneath speed control plate (Figure 4, Item 1).
13. Cover speed control plate opening in engine block to prevent dirt and debris from entering engine.

END OF TASK**Inspect Speed Control Plate****NOTE**

Do not move any adjustment screws from the speed control plate unless plate is damaged and will be replaced.

1. Inspect and replace governor control spring (Figure 3, Item 1) if damaged or stretched.
2. Inspect speed control plate (Figure 4, Item 1) for cracks, bent levers, and other damage. Do not replace old speed control plate if damaged until after all measurement for adjustment screws have been transferred to replacement speed control plate.

END OF TASK

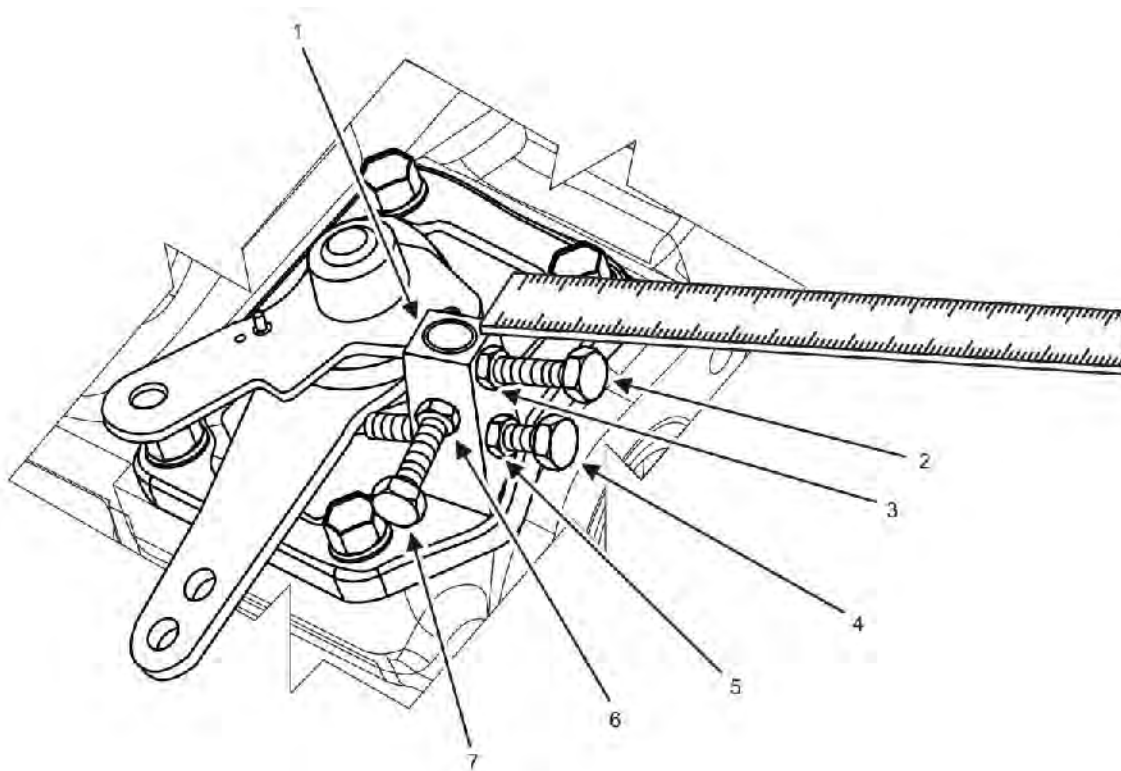
REMOVE/INSTALL SPEED CONTROL PLATE – CONTINUED**Replace Speed Control Plate Screws**

Figure 5. Speed Control Plate Screws - Replace.

NOTE

Stop lever screw (Figure 5, Item 4) and locking nut (Figure 5, Item 5) are not included with the replacement speed control plate.

1. Measure the distance between speed control plate mounting post (Figure 5, Item 1) and the underside of each adjustment screw head (Figure 5, Items 2 and 7) on old speed control plate.
2. Adjust corresponding adjustment screws (Figure 5, Items 2 and 7) on new speed control plate to match the measurements taken in Step 1.
3. Lock the correct adjustments by tightening locking nuts (Figure 5, Items 3 and 6) on each adjustment screw (Figure 5, Items 2 and 7).
4. Measure and record length of stop lever screw (Figure 5, Item 4) from mounting post (Figure 5, Item 1) on old speed control plate.
5. Disengage and loosen locking nut (Figure 5, Item 5) on stop lever screw (Figure 5, Item 4).
6. Remove stop lever screw (Figure 5, Item 4) and locking nut (Figure 5, Item 5) from old speed control plate mounting post (Figure 5, Item 1).
7. Inspect stop lever screw (Figure 5, Item 4) and locking nut (Figure 5, Item 5) for damage and discard if damaged or set aside for reuse.
8. Install stop lever screw (Figure 5, Item 4) and locking nut (Figure 5, Item 5) to new speed control plate mounting post (Figure 5, Item 1).
9. Adjust length of stop lever screw (Figure 5, Item 4) from mounting post (Figure 5, Item 1) to under-side of screw head to match length measured in Step 4.

REMOVE/INSTALL SPEED CONTROL PLATE – CONTINUED

10. Tighten locking nut (Figure 5, Item 5) to secure stop lever screw (Figure 5, Item 4) to mounting post (Figure 5, Item 1).
11. Re-check distance from mounting post (Figure 5, Item 1) to under-side of stop lever screw (Figure 5, Item 4) head to ensure distance remains the same as measured in Step 4.

NOTE

Adjustment screws in speed control plate mounting post are of different sizes. Be sure to tag or mark screws with their proper location upon removal from speed control plate. Replace one adjustment screw at a time.

12. Measure and record length of adjustment screw (Figure 5, Item 2) from mounting post (Figure 5, Item 1).
13. Disengage and loosen locking nut (Figure 5, Item 3) on adjustment screw (Figure 5, Item 2).
14. Remove adjustment screw (Figure 5, Item 2) and locking nut (Figure 5, Item 3) from mounting post (Figure 5, Item 1).
15. Inspect adjustment screw (Figure 5, Item 2) and locking nut (Figure 5, Item 3) for damage and discard if damaged or set aside for reuse.
16. Install adjustment screw (Figure 5, Item 2) and locking nut (Figure 5, Item 3) to new mounting post (Figure 5, Item 1).
17. Adjust length of adjustment screw (Figure 5, Item 2) from mounting post (Figure 5, Item 1) to under-side of screw head to match length measured in Step 12.
18. Tighten locking nut (Figure 5, Item 3) to secure adjustment screw (Figure 5, Item 2) to mounting post (Figure 5, Item 1).
19. Re-check distance from mounting post (Figure 5, Item 1) to under-side of adjustment screw (Figure 5, Item 2) head to ensure distance remains the same as measured in Step 12.
20. Repeat Steps 12 through 19 for adjustment screw (Figure 5, Item 7) and locking nut (Figure 5, Item 6).
21. Discard damaged speed control plate.

END OF TASK**Install Speed Control Plate**

1. Uncover speed control plate cavity on engine.
2. Remove dirt, debris, and oil from speed control plate mounting surface.
3. Position new gasket (Figure 4, Item 2) to its mounting location on engine and align mounting holes.
4. Connect hook on governor control spring (Figure 3, Item 1) to speed control plate lever (Figure 3, Item 2) of using a dental pick.
5. Position speed control plate (Figure 3, Item 4) to its mounting location on engine and align mounting holes.
6. Secure speed control plate (Figure 3, Item 4) to engine by installing four new screws with lockwashers (Figure 3, Item 3).
7. Disengage and loosen locking nut (Figure 2, Item 3) several turns.
8. Turn lever stop screw (Figure 2, Item 2) six complete clockwise turns to return to normal operating position.
9. Secure locking nut (Figure 2, Item 3).
10. Install engine stop solenoid (WP 0078, Remove/Install Governor Actuator).
11. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).

REMOVE/INSTALL SPEED CONTROL PLATE – CONTINUED

12. Close generator set doors.
13. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
14. Start engine and check for proper operation (TM 9-6115-749-10). Bring coolant to normal operating temperature and then apply a 100% rated load for 30 min (TM 9-6115-749-10).
15. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

REMOVE/INSTALL FUEL INJECTION PUMP

INITIAL SETUP:

Tools and Special Tools

Hammer, Hand, Soft Face, Dead Blow (WP 0162, Table 2, Item 15)
 Pick, Miniature (WP 0162, Table 2, Item 20)
 Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Personnel Required

91D (1)
 Assistant (1)

References

WP 0064, Remove/Install 50/60 Hz Engine Assembly
 WP 0065, Remove/Install 400 Hz Engine Assembly

Materials/Parts

Pump assembly, fuel injection (WP 0129, Item 11)
 Shim (0.200 mm) (WP 0129, Item 5)
 Shim (0.250 mm) (WP 0129, Item 6)
 Shim (0.300 mm) (WP 0129, Item 7)
 Washer (2) (WP 0129, Item 1)
 Cap set, protective (WP 0163, Table 1, Item 8)
 Grease, electrically conductive (WP 0163, Table 1, Item 20)
 Pan, drain (WP 0163, Table 1, Item 28)
 Rag, wiping (WP 0163, Table 1, Item 31)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool
 Battery ground cable removed (WP 0036, Remove/Install Batteries)
 Top body panel removed (WP 0028, Remove/Install Top Body Panel)
 Fuel injection lines removed (WP 0069, Remove/Install Fuel Injector)
 Governor actuator removed (WP 0078, Remove/Install Governor Actuator)
 Speed control plate removed (WP 0070, Remove/Install Speed Control Plate)

REMOVE/INSTALL FUEL INJECTION PUMP

WARNING

Fuel is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash skin and change clothing promptly if in contact with fuel. Failure to comply may cause injury or death to personnel.

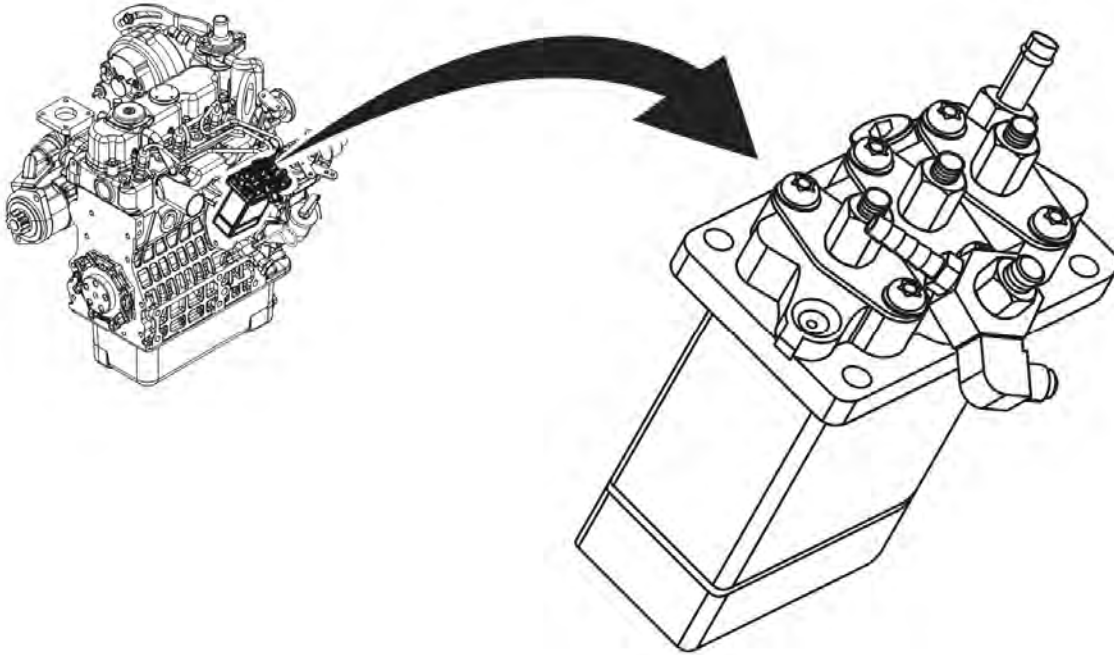
REMOVE/INSTALL FUEL INJECTION PUMP – CONTINUED**Remove Fuel Injection Pump**

Figure 1. Fuel Injection Pump - Location.

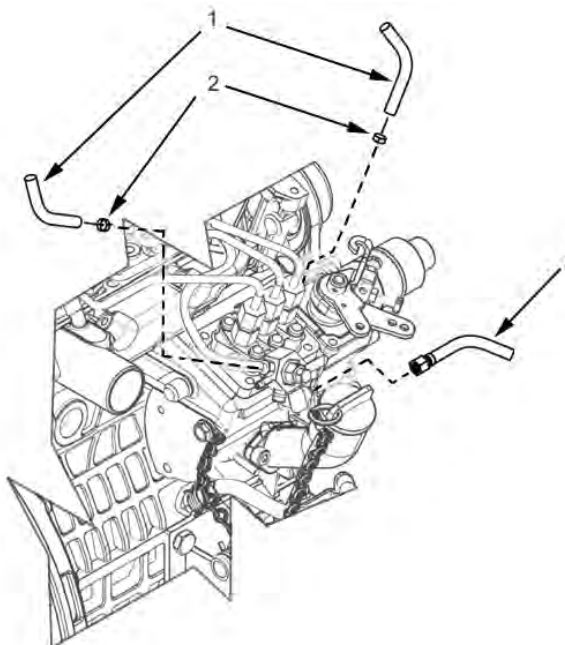
WARNING

Fuels used in the generator set are combustible. Do not smoke or use open fire when performing maintenance. Fire and possible explosion may result. Failure to comply may cause injury or death to personnel and damage to equipment.

NOTE

Capture spilled fuel and dispose of IAW local SOP.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Open right-side door of generator set.
3. Locate fuel injection pump (Figure 1).

REMOVE/INSTALL FUEL INJECTION PUMP – CONTINUED**Figure 2. Fuel Injection Pump - Hoses.**

4. Remove fuel supply engine line (Figure 2, Item 3) from fuel injection pump. Cap/plug fuel supply engine line (Figure 2, Item 3) and opening on fuel injection pump (Figure 4, Item 4).
5. Loosen hose clips (Figure 2, Item 2) and slide back on fuel return lines (Figure 2, Item 1) on fuel injection pump (Figure 4, Item 4).
6. Remove fuel return lines (Figure 2, Item 1) from fuel injection pump. Cap/plug fuel return lines (Figure 2, Item 1) and openings on fuel injection pump (Figure 4, Item 4).

REMOVE/INSTALL FUEL INJECTION PUMP – CONTINUED

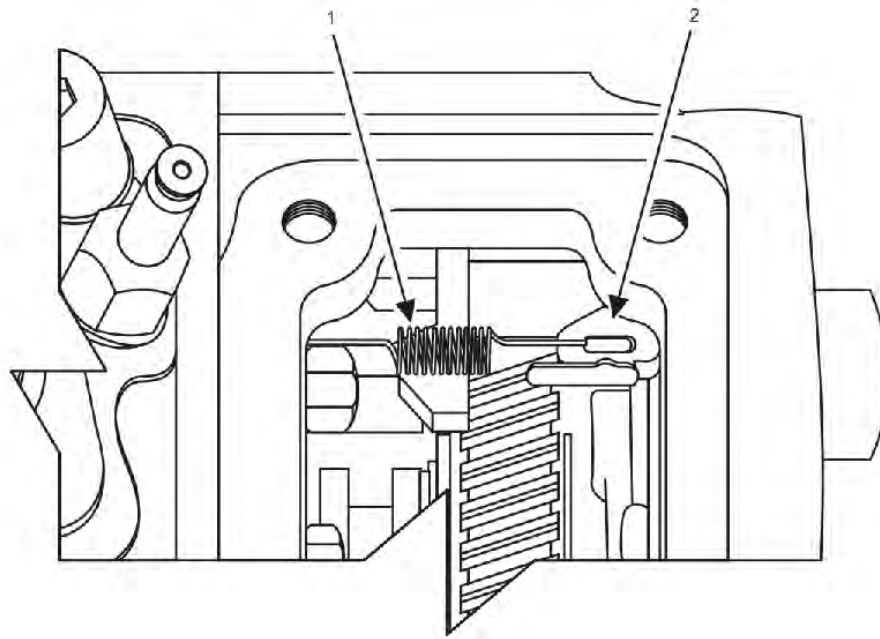


Figure 3. Fuel Injection Pump - Start Spring and Bracket.

CAUTION

Start spring (Figure 3, Item 1) must remain attached to fuel injection pump (Figure 4, Item 4) once disconnected from the speed control plate (Figure 3, Item 2). If start spring falls into engine cavity, it must be retrieved before proceeding and saved for reuse at installation. Failure to comply may cause damage to equipment.

7. Ensure start spring (Figure 3, Item 1) remains attached to fuel injection pump (Figure 4, Item 4) once disconnected from the speed control plate (Figure 3, Item 2).

REMOVE/INSTALL FUEL INJECTION PUMP – CONTINUED

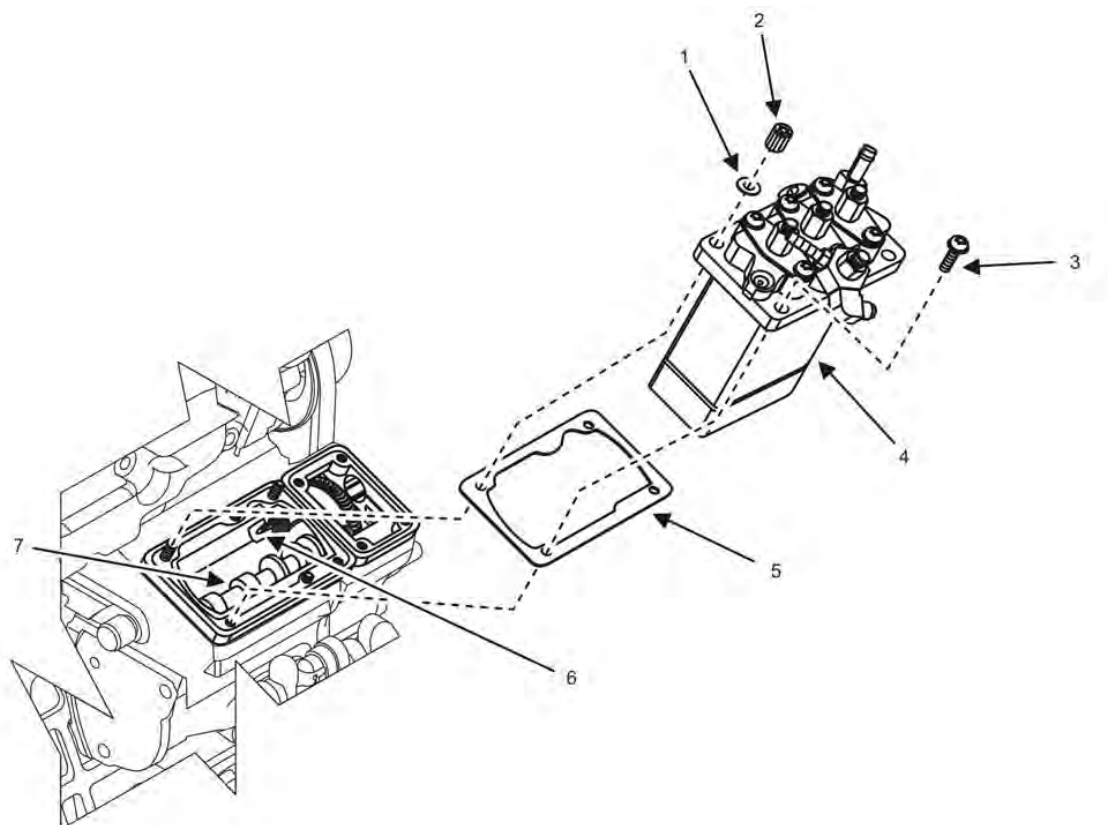


Figure 4. Fuel Injection Pump - Removal.

8. Remove two long socket head nuts (Figure 4, Item 2), two socket head screws (Figure 4, Item 3), and two lockwashers (Figure 4, Item 1) securing fuel injection pump (Figure 4, Item 4) to engine. Discard lockwashers (Figure 4, Item 1).

NOTE

Fuel injection pump (Figure 5, Item 1) is under slight spring tension. A light tap with a rubber mallet may be necessary to loosen the pump from the engine.

9. Remove fuel injection pump (Figure 5, Item 1) from engine with start spring (Figure 5, Item 2) attached.
10. Remove start spring (Figure 5, Item 2) from fuel injection pump (Figure 5, Item 1) and set aside for reuse.

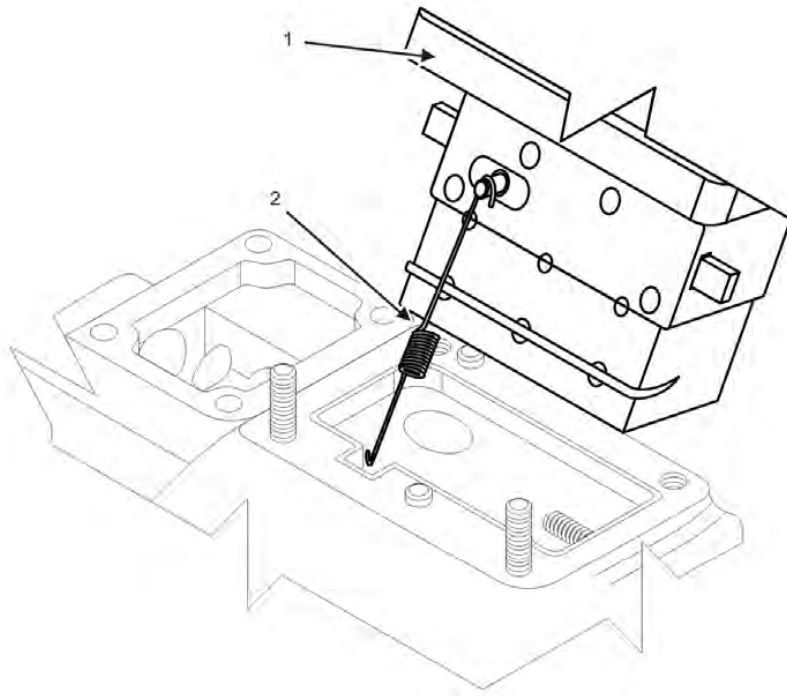
REMOVE/INSTALL FUEL INJECTION PUMP – CONTINUED

Figure 5. Fuel Injection Pump - Start Spring to Fuel Injection Pump.

CAUTION

Thickness of shim(s) (Figure 4, Item 5) is critical to performance of fuel injection system. Always replace damaged shim(s) (Figure 4, Item 5) with shim(s) (Figure 4, Item 5) of equivalent total thickness. Failure to comply may cause damage to equipment.

NOTE

Replace shims (Figure 4, Item 5) only when fuel injection pump (Figure 4, Item 4) and/or fuel camshaft (Figure 4, Item 7) are replaced or if the fuel injection system requires adjustment after performing the procedures in the Check Fuel Injection Adjustment task. If simply removing and installing fuel injection pump (Figure 4, Item 4), reuse the existing shims (Figure 4, Item 5).

11. Remove shim(s) (Figure 4, Item 5) from mounting location on engine.
12. Cover fuel injection pump cavity in engine block to prevent dirt and debris from entering engine.
13. Record thickness of shim(s) (Figure 4, Item 5) using markings on bottom of shims. See Adjust Fuel Injection Timing task.

END OF TASK**Inspect Fuel Injection Pump**

1. Inspect fuel injection pump (Figure 5, Item 1) for damage and replace fuel injection pump if damaged.
2. Inspect start spring (Figure 5, Item 2) for damage and replace if damaged or overstretched.

REMOVE/INSTALL FUEL INJECTION PUMP – CONTINUED**END OF TASK****Install Fuel Injection Pump**

1. Remove cover from fuel injection pump cavity on engine block.
2. Remove any oil, dirt, and debris from fuel injection pump mounting surface on engine block.
3. Clean dirt and oil from shims (Figure 4, Item 5) using a wiping rag.
4. Move fork lever (Figure 4, Item 6) to gear case side of engine cavity.
5. Ensure that start spring (Figure 5, Item 2) is free for attachment to speed control plate.

CAUTION

Thickness of shim(s) (Figure 4, Item 5) is critical to performance of fuel injection system. Always replace damaged shim(s) (Figure 4, Item 5) with shim(s) (Figure 4, Item 5) of equivalent total thickness. Addition or reduction of shim thickness by 0.0020 in (0.06 mm) delays or advances injection timing approximately 0.5 degrees (0.0087 rad). Failure to comply may cause damage to equipment.

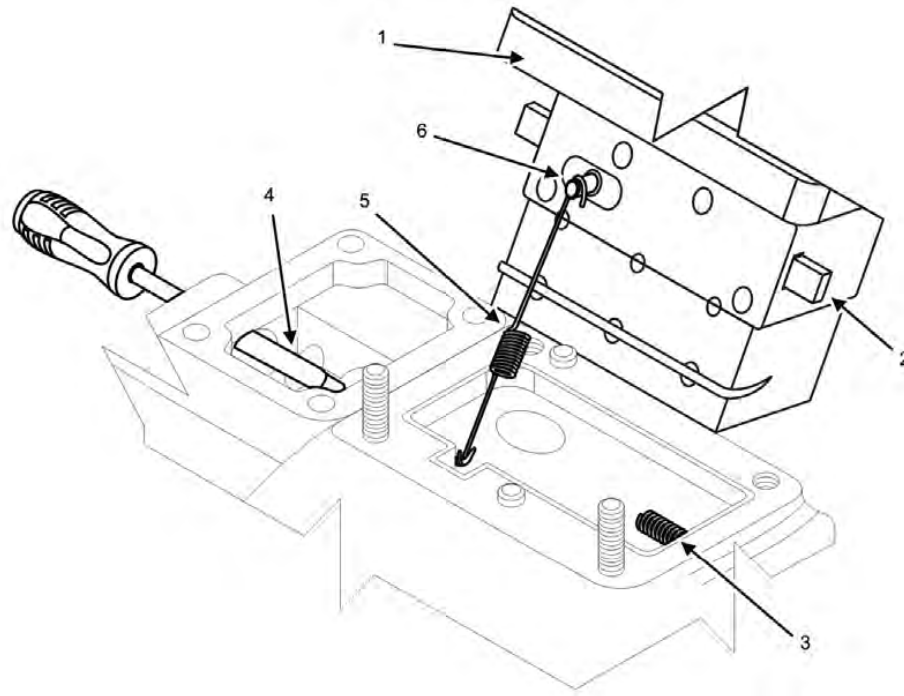
CAUTION

Do not apply liquid sealant or gasket adhesive to shims (Figure 4, Item 5), as this will adversely affect performance of the fuel injection system. Failure to comply may cause damage to equipment.

NOTE

Replace shims (Figure 4, Item 5) only when fuel injection pump (Figure 4, Item 4) and/or fuel camshaft (Figure 4, Item 7) are replaced or if the fuel injection system requires adjustment after performing the procedures in the Check Fuel Injection Adjustment task. If simply removing and installing fuel injection pump (Figure 4, Item 4), reuse the existing shims (Figure 4, Item 5).

6. Position clean shim(s) (Figure 4, Item 5) to mounting location on engine and align mounting holes.

REMOVE/INSTALL FUEL INJECTION PUMP – CONTINUED**Figure 6. Fuel Injection Pump - Install.**

7. Install start spring (Figure 6, Item 5) to injection pump control rack pin (Figure 6, Item 6) on back of fuel injection pump (Figure 6, Item 1).
8. Install fuel injection pump (Figure 6, Item 1) to mounting location on engine.

NOTE

Miniature pick may be inserted through the governor actuator opening in front of engine to retrieve the start spring (Figure 6, Item 5).

9. Engage open hook of start spring (Figure 6, Item 5) using hook end of miniature pick (Figure 6, Item 4).

CAUTION

Do not overstretch start spring (Figure 6, Item 5), as it may be permanently damaged if stretched too far. Failure to comply may cause damage to equipment.

10. Attach hook end of start spring (Figure 3, Item 1) to speed control plate (Figure 3, Item 2).
 - a. If spring is dropped during installation, search fuel pump cavity in engine block using a magnet.
 - b. If spring is dropped into engine during installation and cannot be retrieved from fuel pump cavity with a magnet, remove oil pan and/or front gear case cover.
 - c. If spring cannot be found in Steps a and b, replace engine (WP 0064, Remove/Install 50/60 Hz Engine Assembly or WP 0065, Remove/Install 400 Hz Engine Assembly).
11. Check that control rod (Figure 6, Item 2) is pushed by adjusting spring (Figure 6, Item 3) and that injection pump control rack pin (Figure 6, Item 6) on control rod (Figure 6, Item 2) engages fork lever (Figure 4, Item 6).

REMOVE/INSTALL FUEL INJECTION PUMP – CONTINUED**NOTE**

Due to spring tension, fuel injection pump (Figure 4, Item 4) will not rest completely on shim(s) (Figure 4, Item 5) until fuel injection pump (Figure 4, Item 4) is fully secured with mounting hardware (Figure 4, Items 1, 2, and 3).

12. Position fuel injection pump (Figure 4, Item 4) to mounting location on engine and align mounting holes.
13. Secure fuel injection pump (Figure 4, Item 4) to engine by installing two long socket head nuts (Figure 4, Item 2), two socket head screws (Figure 4, Item 3), and two new lockwashers (Figure 4, Item 1).
14. Remove caps/plugs from fuel return lines (Figure 2, Item 1).
15. Install fuel return lines (Figure 2, Item 1) to fuel injection pump (Figure 4, Item 4).
16. Loosen hose clips (Figure 2, Item 2) and position to secure fuel return lines (Figure 2, Item 1) on fuel injection pump.
17. Install fuel supply engine line (Figure 2, Item 3) to fuel injection pump.

CAUTION

If fuel injection pump has been replaced, check fuel injection adjustment. See Check Fuel Injection Adjustment task. Failure to comply may cause damage to equipment.

18. Install speed control plate (WP 0070, Remove/Install Speed Control Plate).
19. Install governor actuator (WP 0078, Remove/Install Governor Actuator).
20. Install fuel injectors and lines (WP 0069, Remove/Install Fuel Injector).
21. Install top panel onto generator set (WP 0028, Remove/Install Top Body Panel).
22. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
23. Close right-side door of generator set.
24. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
25. Start engine and check for proper operation (TM 9-6115-749-10). Bring coolant to normal operating temperature and then apply a 100% rated load for 30 minutes (TM 9-6115-749-10).
26. Repair as required.
27. Dispose of soiled rags IAW local SOP.

END OF TASK**Check Fuel Injection Adjustment**

1. Remove fuel injection lines (WP 0069, Remove/Install Fuel Injector) if not already removed.
2. Remove governor actuator (WP 0078, Remove/Install Governor Actuator) if not already removed.
3. Ensure fuel supply engine line (Figure 7, Item 3) is connected to fuel injection pump.
4. Turn flywheel (Figure 7, Item 1) counterclockwise (when facing flywheel (Figure 7, Item 1)) until fuel fills up hole of delivery valve holder (Figure 7, Item 2) for number one cylinder.
5. Turn flywheel (Figure 7, Item 4) clockwise (when facing flywheel (Figure 7, Item 4)) approximately 90°.
6. Turn flywheel (Figure 8, Item 1) counterclockwise to 25° timing mark (Figure 8, Item 3) on flywheel (before TDC timing mark (Figure 8, Item 4)).

REMOVE/INSTALL FUEL INJECTION PUMP – CONTINUED

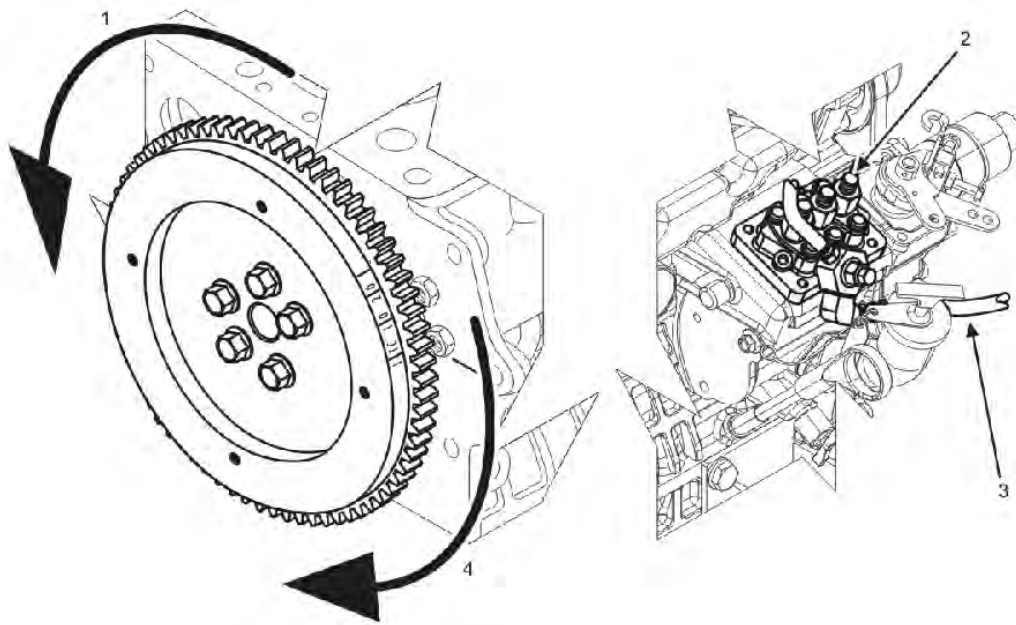


Figure 7. Flywheel and Fuel Delivery Valve.

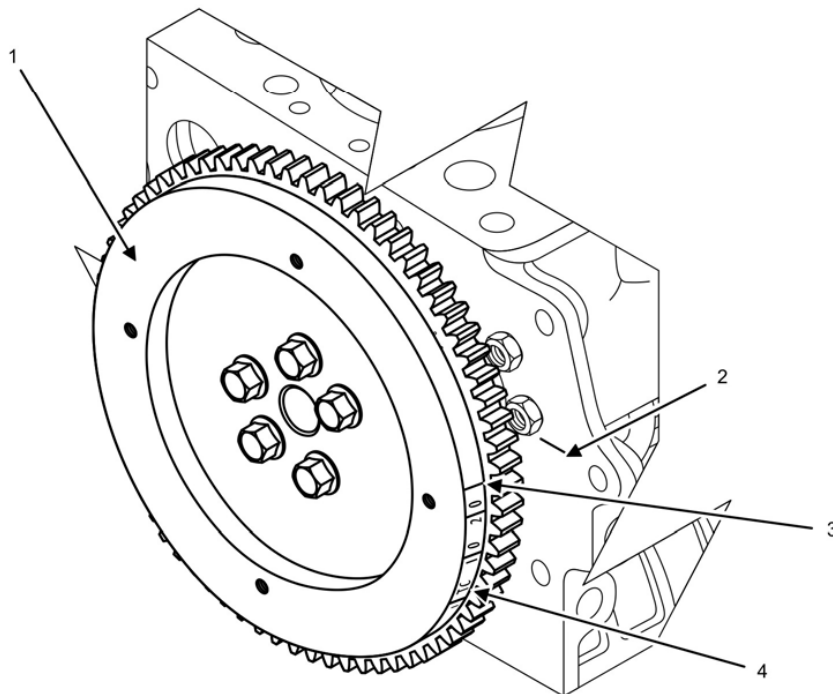


Figure 8. Flywheel Timing Marks Aligned.

REMOVE/INSTALL FUEL INJECTION PUMP – CONTINUED

7. Continue to turn flywheel (Figure 8, Item 1) counterclockwise slowly and stop when fuel level at tip of fuel delivery holder (Figure 7, Item 2) of number one cylinder begins to increase.
8. Compare position of flywheel timing mark aligned with alignment mark (Figure 8, Item 2) to factory specification in Table 1.

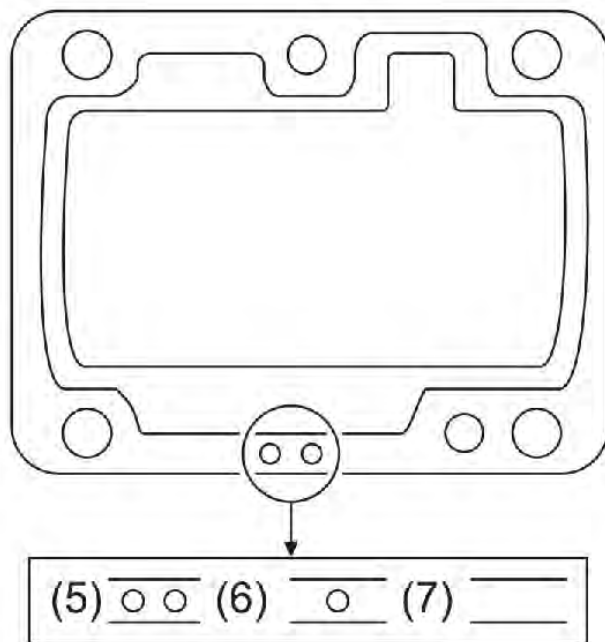
Table 1. Fuel Injection Adjustment Specification.

Injection timing/factory specification	19-21° (0.33-0.37 rad before TDC)
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9. Calculate difference between factory specification shown in Table 1 and position of flywheel timing marks on machine to determine extent of required adjustment.
10. Complete installation if fuel injection adjustment is to specification. See Install Fuel Injection Pump task.
11. Adjust fuel injection using shims (Figure 4, Item 5), if fuel injection adjustment is not to specification. See Adjust Fuel Injection Timing task.

END OF TASK**Adjust Fuel Injection Timing**

1. Check fuel injection adjustment. See Check Fuel Injection Adjustment task.
2. Remove fuel injection pump. See Remove Fuel Injection Pump task.
3. Check and record number and size of shims (Figure 4, Item 5) removed with fuel injection pump (Figure 4, Item 4). Size of shim is determined by number of holes along bottom edge of shim. Shims are identified by the number of holes on the shim in the location shown in Figure 9.

**Figure 9. Fuel Injection Pump Shims.**

REMOVE/INSTALL FUEL INJECTION PUMP – CONTINUED**NOTE**

Fuel injection is adjusted by adding or reducing the number of shims (Figure 4, Item 5) at the fuel injection pump mounting. Shims (Figure 4, Item 5) are available in 0.02 in (0.5 mm) increments from 0.0079 in (0.20 mm) to 0.0118 in (0.30 mm). Addition or reduction of a shim (Figure 4, Item 5) (0.0020 in, 0.05 mm) delays or advances fuel injection adjustment by approximately 0.5° (0.0087 rad).

4. Calculate correct number of fuel injection pump shims (Table 2) required to properly adjust fuel injection, using difference between factory specification and position of flywheel timing marks calculated when fuel injection adjustment was checked. See Check Fuel Injection Adjustment task.

Table 2. Fuel Injection Pump Shim Sizes.

NUMBER OF HOLES	THICKNESS OF SHIM
No holes	0.0118 in (0.30 mm)
1 hole	0.0098 in (0.25 mm)
2 holes	0.0079 in (0.20 mm)

CAUTION

Excess shim material will cause incorrect fuel injection adjustment which may lead to poor performance or engine damage. Be sure to remove all residual shim material from engine block when replacing shim. Failure to comply may cause damage to equipment.

5. Remove shim(s) (Figure 4, Item 5) from fuel injection pump mounting location on engine block.
6. Install proper number of clean shim(s) (Figure 4, Item 5) as calculated in Step 4 to their mounting location on engine block and align mounting holes.
7. Install fuel injection pump. See Install Fuel Injection Pump task.
8. Re-check fuel injection adjustment and repair as required. See Check Fuel Injection Adjustment task.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE

REMOVE/INSTALL THERMOSTAT HOUSING

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Materials/Parts

Bolt, machine (2) (WP 0130, Item 1)
 Bolt, machine (1) (WP 0130, Item 11)
 Bolt, machine (2) (WP 0130, Item 11)
 Gasket (WP 0130, Item 7)
 Housing, thermostat (WP 0130, Item 8)
 Antifreeze, ethylene glycol (WP 0163, Table 1, Item 2)
 Cleaning compound, solvent (WP 0163, Table 1, Item 10)
 Compound, sealing (WP 0163, Table 1, Item 15)
 Detergent, general purpose (WP 0163, Table 1, Item 16)
 Grease, electrically conductive (WP 0163, Table 1, Item 20)
 Rag, wiping (WP 0163, Table 1, Item 31)

Materials/Parts - cont'd

Sealant (WP 0163, Table 1, Item 32)

Personnel Required

91D (1)
 Assistant (1)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool
 Battery ground cable removed (WP 0036, Remove/Install Batteries)
 Top body panel removed (WP 0028, Remove/Install Top Body Panel)
 Thermostat removed (WP 0073, Remove/Install Thermostat)
 Battery-Charging alternator removed (WP 0075, Remove/Install Battery-Charging Alternator Assembly)

REMOVE/INSTALL THERMOSTAT HOUSING**WARNING**

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Do not ground yourself in standing water. Failure to comply may cause injury or death to personnel and damage to equipment.

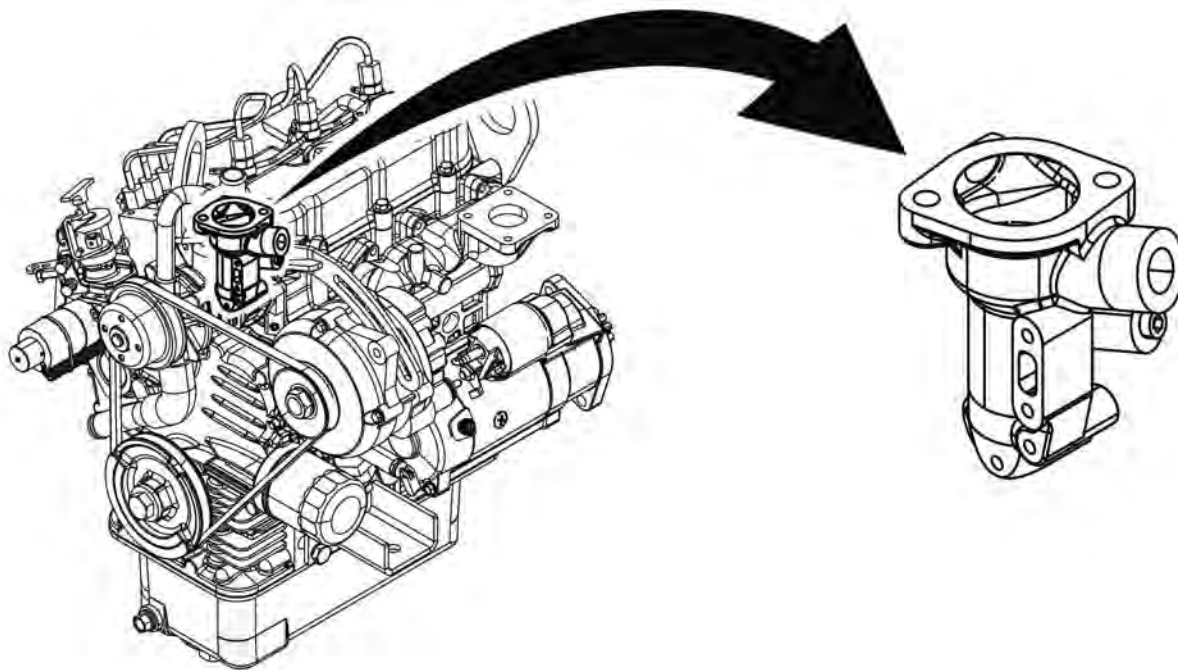
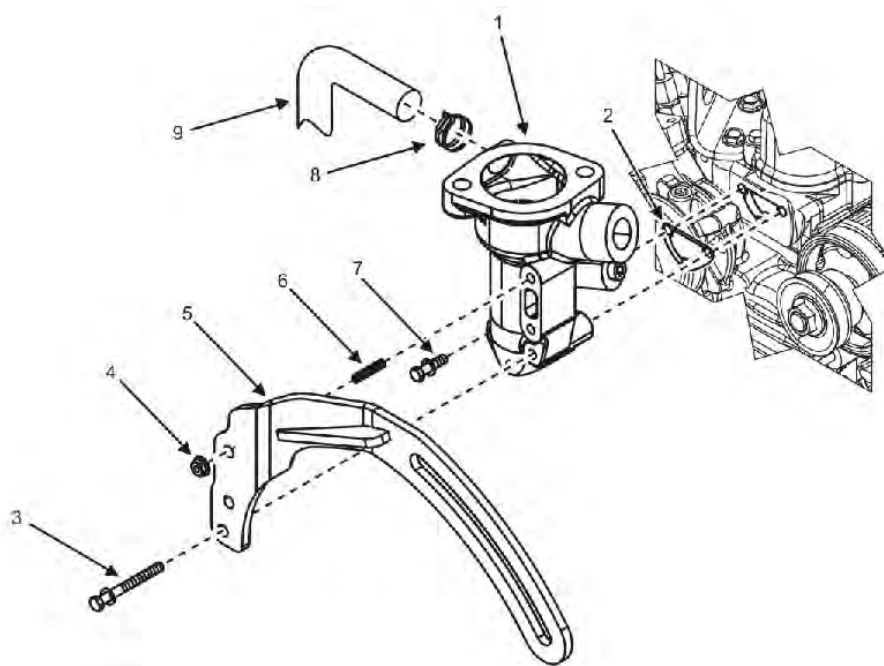
REMOVE/INSTALL THERMOSTAT HOUSING – CONTINUED**Remove Thermostat Housing**

Figure 1. Thermostat Housing - Location.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate thermostat housing (Figure 1).

REMOVE/INSTALL THERMOSTAT HOUSING – CONTINUED

**Figure 2. Thermostat Housing - Detail.**

3. Remove two nuts (Figure 2, Item 4) securing battery-charging alternator bracket (Figure 2, Item 5) to two studs (Figure 2, Item 6) on thermostat housing (Figure 2, Item 1).
4. Remove and discard lower bolt with captive washer (Figure 2, Item 3).
5. Remove battery-charging alternator bracket (Figure 2, Item 5) from thermostat housing (Figure 2, Item 1).
6. Loosen hose clip (Figure 2, Item 8) on hose (Figure 2, Item 9) at thermostat housing (Figure 2, Item 1).
7. Remove hose (Figure 2, Item 9) from thermostat housing (Figure 2, Item 1).

NOTE

There are two different lengths of the thermostat housing bolts. Note location of current bolts for reference when installing new bolts.

8. Remove and discard two bolts with captive washers (Figure 2, Item 7) securing thermostat housing (Figure 2, Item 1) to cylinder head.

NOTE

Gasket (Figure 2, Item 2) material may stick to cylinder head when thermostat housing (Figure 2, Item 1) is removed.

9. Remove thermostat housing (Figure 2, Item 1) and gasket (Figure 2, Item 2) from cylinder head. Discard gasket (Figure 2, Item 2).

WARNING

Compound cleaning solvent is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection is required. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply may cause injury or death to personnel.

REMOVE/INSTALL THERMOSTAT HOUSING – CONTINUED**CAUTION**

When scraping gasket material from engine block, keep gasket scrapings and other foreign material from entering the engine block. Do not use a screw driver to scrape gasket material. Failure to comply may cause damage to equipment.

10. Remove residual sealant material from cylinder head with a putty knife and compound cleaning solvent.

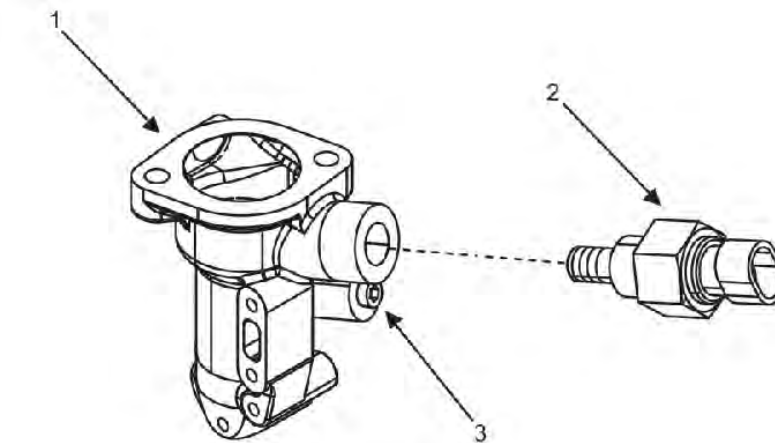


Figure 3. Temperature Sensor - Removal.

11. Disconnect wires (not shown) from water temperature sensor (Figure 3, Item 2).
12. Remove water temperature sensor (Figure 3, Item 2) from thermostat housing (Figure 3, Item 1).
13. If housing is being replaced, remove plug (Figure 3, Item 3) from thermostat housing (Figure 3, Item 1).

END OF TASK**Inspect Thermostat Housing**

1. Inspect thermostat housing (Figure 2, Item 1) for damage and/or cracks and replace as required.
2. Inspect hose (Figure 2, Item 9) and hose clip (Figure 2, Item 8) for damage and replace as required.
3. Inspect plug (Figure 3, Item 3) found underneath temperature sensor (Figure 3, Item 2) on thermostat housing (Figure 3, Item 1) for damage and replace as required.
4. Inspect temperature sensor (Figure 3, Item 2) for damage and replace as required.

Test Temperature Sensor**WARNING**

Cooling system operates at high temperature and pressure. Contact with high-pressure steam and/or liquids can cause burns and scalding. Shut down generator set and allow system to cool before performing checks, services, and maintenance. Wear gloves, additional protective clothing, and goggles as required. Failure to comply may cause injury or death to personnel.

REMOVE/INSTALL THERMOSTAT HOUSING – CONTINUED

NOTE

Temperature sensor can be tested while installed in the water pump or tested removed. Ambient air temperature will need to be determined when temperature sensor is removed from water pump. When testing while installed in water pump, DCS coolant temperature reading will need to be recorded before removing unit wiring connector from temperature switch. Use appropriate temperature range in Table 1 when comparing ohm measurement obtained from test.

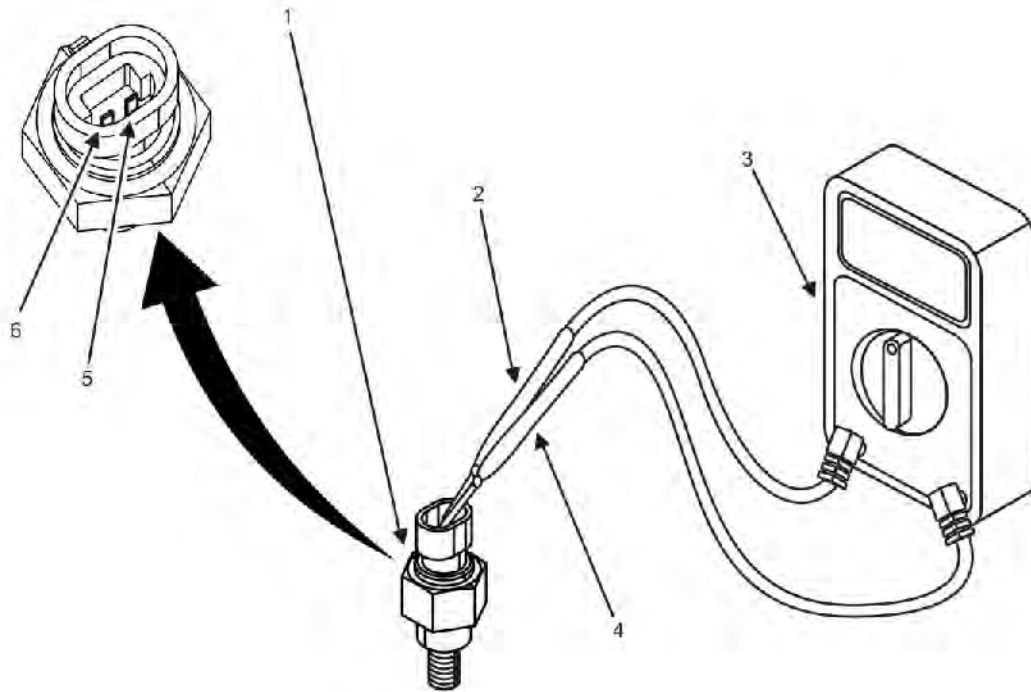


Figure 4. Test Temperature Sensor.

Table 1. Temperature Sensor Resistance.

DEGREES (F°)	RESISTANCE (OHMS)	DEGREES (°F)	RESISTANCE (OHMS)
0	700	120	1,195
10	735	130	1,245
20	770	140	1,295
30	810	150	1,347
40	848	160	1,400
50	887	170	1,455
60	928	180	1,512
70	970	190	1,570
80	1,012	200	1,625
90	1,056	210	1,685
100	1,100	220	1,745

REMOVE/INSTALL THERMOSTAT HOUSING – CONTINUED**Table 1. Temperature Sensor Resistance. – Continued**

DEGREES (F°)	RESISTANCE (OHMS)	DEGREES (°F)	RESISTANCE (OHMS)
110	1,148	230	1,804

1. If removed from engine, position temperature sensor (Figure 4, Item 1) on a suitable work surface or open leftside door and leave installed in engine.
2. If testing temperature sensor (Figure 4, Item 1) removed from engine, allow 5 min for temperature sensor (Figure 4, Item 1) to reach ambient air temperature.
3. If testing temperature sensor (Figure 4, Item 1) removed from engine, determine ambient air temperature using a thermometer.
4. If testing temperature sensor (Figure 4, Item 1) installed in engine (TM 9-6115-749-10), determine coolant temperature on DCS screen by installing negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries) and turning engine control switch to PRIME & RUN.
5. Record reading, remove negative ground cable from right-hand battery (WP 0036, Remove/Install Batteries), and turn engine control switch to OFF (TM 9-6115-749-10).

WARNING

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

6. If necessary, disconnect unit wiring (not pictured) from temperature sensor (Figure 4, Item 1).
7. Attach one multimeter lead (Figure 4, Item 2) set to ohms to one connector lead (Figure 4, Item 5) of temperature sensor.
8. Attach second multimeter lead (Figure 4, Item 4) to second connector lead (Figure 4, Item 6) of temperature sensor.
9. Record multimeter (Figure 4, Item 3) measurement.
10. Compare multimeter (Figure 4, Item 3) measurement with corresponding temperature in Table 1.
11. Replace temperature sensor (Figure 4, Item 1) if multimeter (Figure 4, Item 3) measurement does not correspond to Table 1 ohm values.
12. If necessary, remove multimeter leads (Figure 4, Items 2 and 4) and connect unit wiring (not pictured) to temperature sensor (Figure 4, Item 1) and close left-side door.

END OF TASK**Install Thermostat Housing**

1. Apply sealant to thermostat housing mounting surface on cylinder head.
2. Position gasket (Figure 2, Item 2) to its mounting location on cylinder head and align mounting holes.
3. Position thermostat housing (Figure 2, Item 1) to its mounting location on new gasket (Figure 2, Item 2) and align mounting holes.

REMOVE/INSTALL THERMOSTAT HOUSING – CONTINUED**CAUTION**

Ensure that the longer of the thermostat housing bolts is installed on exhaust side of the housing. Failure to comply may cause damage to equipment.

4. Secure thermostat housing (Figure 2, Item 1) and gasket (Figure 2, Item 2) to cylinder head by installing two new bolts with captive washers (Figure 2, Item 7).
5. Move to Step 8 unless thermostat housing (Figure 2, Item 1) is being replaced.
6. Install plug (Figure 3, Item 3) into new thermostat housing (Figure 3, Item 1) using pipe joint compound.
7. Install water temperature sensor (Figure 3, Item 2) into new thermostat housing (Figure 3, Item 1) using pipe joint compound.
8. Position hose (Figure 2, Item 9) to thermostat housing (Figure 2, Item 1).
9. Secure hose (Figure 2, Item 9) with hose clip (Figure 2, Item 8) to thermostat housing (Figure 2, Item 1).
10. Connect electrical wiring to water temperature sensor (Figure 3, Item 2).
11. Position battery-charging alternator bracket (Figure 2, Item 5) to thermostat housing (Figure 2, Item 1).
12. Install new lower bolt with captive washer (Figure 2, Item 3).
13. Install two nuts (Figure 2, Item 4) securing battery-charging alternator bracket (Figure 2, Item 5) to studs (Figure 2, Item 6) on thermostat housing (Figure 2, Item 1).
14. Install battery-charging alternator (WP 0075, Remove/Install Battery-Charging Alternator Assembly).
15. Install thermostat (WP 0073, Remove/Install Thermostat).
16. Install top body panel (WP 0028, Remove/Install Top Body Panel).
17. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
18. Close generator set doors.
19. Release air through overflow vent line for 5 min (TM 9-6115-749-10).
20. Check coolant levels and fill as required (TM 9-6115-749-10).
21. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
22. Start engine and check for proper operation (TM 9-6115-749-10). Bring coolant to normal operating temperature and then apply a 100% rated load for 30 min (TM 9-6115-749-10).
23. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

REMOVE/INSTALL THERMOSTAT

INITIAL SETUP:**Test Equipment**

Thermometer, Self-Indicating (WP 0162, Table 2, Item 31)

Personnel Required

91D (1)
Assistant (1)

Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

References

WP 0021, Service Cooling System

Materials/Parts

Bolt, machine (2) (WP 0130, Item 1)
Gasket (WP 0130, Item 3)
Thermostat, flow control (WP 0130, Item 4)
Antifreeze, ethylene glycol (WP 0163, Table 1, Item 2)
Cap set, protective (WP 0163, Table 1, Item 8)
Distilled water (WP 0163, Table 1, Item 17)
Fuel, diesel (WP 0163, Table 1, Item 19)
Grease, electrically conductive (WP 0163, Table 1, Item 20)
Sealant (WP 0163, Table 1, Item 32)
Wire, tie (WP 0163, Table 1, Item 37)

Equipment Condition

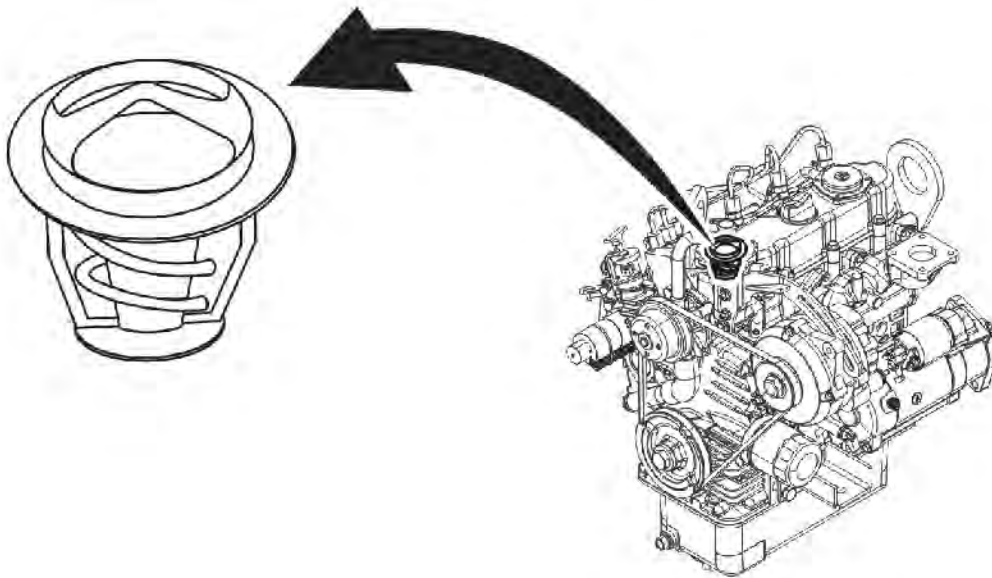
Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)
Top body panel removed (WP 0028, Remove/Install Top Body Panel)
Upper radiator hose removed (WP 0024, Remove/Install Radiator Hose and Tube Assemblies)

REMOVE/INSTALL THERMOSTAT**WARNING**

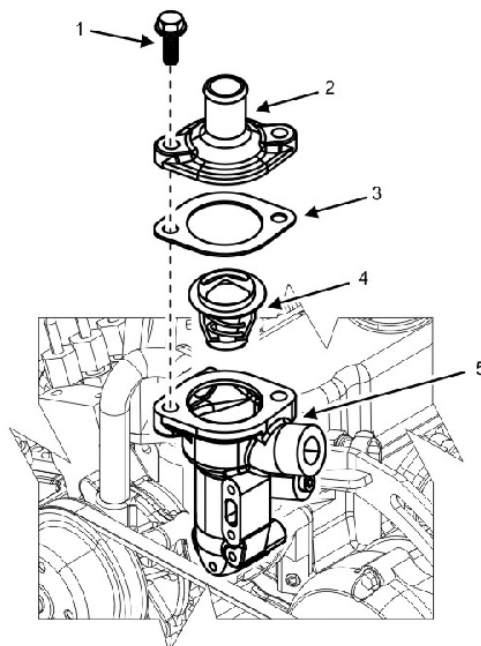
Hot coolant can burn. If the radiator cap is hot to the touch, it is too hot to open. Allow the coolant to cool before opening the radiator cap. Wear gloves, additional protective clothing, and goggles as required. Contact with high-pressure steam and/or liquids can cause burns and scalding. Failure to comply may cause injury or death to personnel.

WARNING

Engine coolant is toxic to eyes and poisonous if ingested. Eye protection is required when working with engine coolant. Avoid repeated or prolonged contact. Failure to comply may cause injury or death to personnel.

REMOVE/INSTALL THERMOSTAT – CONTINUED**Remove Thermostat****Figure 1. Thermostat - Location.**

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate thermostat (Figure 1) inside thermostat housing.

**Figure 2. Thermostat Replacement - Detail.**

REMOVE/INSTALL THERMOSTAT – CONTINUED**NOTE**

Captured coolant should be disposed of IAW local SOP.

3. Remove and discard two bolts with captive lockwashers (Figure 2, Item 1) from thermostat cover (Figure 2, Item 2).
4. Remove thermostat cover (Figure 2, Item 2) and set aside for reuse.
5. Remove and discard thermostat gasket (Figure 2, Item 3).
6. Remove thermostat (Figure 2, Item 4) from thermostat housing (Figure 2, Item 5).
7. Inspect thermostat cover (Figure 2, Item 2) and thermostat housing (Figure 2, Item 5) for damage and/or cracks and replace as required.
8. Cap/plug opening in thermostat housing (Figure 2, Item 5) to prevent dirt and debris from entering cooling system.

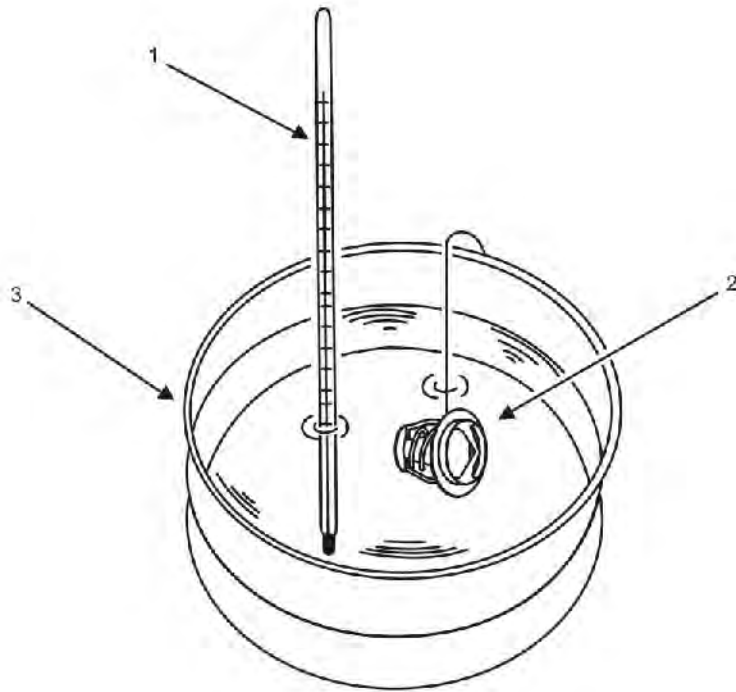
END OF TASK**Test Thermostat**

Figure 3. Test Thermostat.

1. Install thermostat (Figure 3, Item 2) and thermometer (Figure 3, Item 1) into bucket of water (Figure 3, Item 3) using wire.
2. Place bucket of water (Figure 3, Item 3) with suspended thermostat (Figure 3, Item 2) and thermometer (Figure 3, Item 1) over heat source.
3. Gradually apply heat to bucket (Figure 3, Item 3) and begin to monitor temperature on thermostat (Figure 3, Item 1).

REMOVE/INSTALL THERMOSTAT – CONTINUED**NOTE**

Thermostat should begin to open at 157-163 °F (69-72.5 °C). Thermostat should be fully open at 185 °F (85 °C).

4. Verify temperature at which thermostat (Figure 3, Item 2) begins to open.
5. Continue to apply heat to bucket (Figure 3, Item 3) and monitor water temperature.
6. Verify temperature at which thermostat (Figure 3, Item 2) completely opens (approximately 0.315 in (8 mm)).
7. Replace thermostat (Figure 3, Item 2) if thermostat (Figure 3, Item 2) does not react IAW either specification noted above.

END OF TASK**Install Thermostat**

1. Wipe down hoses, parts, and connectors with wiping rag prior to installation.
2. Remove any gasket residue from thermostat housing (Figure 2, Item 5) and thermostat cover (Figure 2, Item 2).

CAUTION

Spring portion of thermostat should be installed inside the thermostat housing. Failure to comply may cause damage to equipment.

3. Install thermostat (Figure 2, Item 4) in thermostat housing (Figure 2, Item 5).
4. Install new thermostat gasket (Figure 2, Item 3) over thermostat (Figure 2, Item 4).
5. Apply sealing compound to surface of thermostat cover (Figure 2, Item 2) that contacts thermostat gasket (Figure 2, Item 3).
6. Install thermostat cover (Figure 2, Item 2).
7. Secure thermostat cover (Figure 2, Item 2) using two new bolts with captive lockwashers (Figure 2, Item 1).
8. Install upper coolant hose (not shown) (WP 0024, Remove/Install Radiator Hose and Tube Assemblies).
9. Fill cooling system as required (WP 0021, Service Cooling System).
10. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
11. Install top body panel (WP 0028, Remove/Install Top Body Panel).
12. Close generator set doors.
13. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
14. Start engine and run check for leaks and proper operation (TM 9-6115-749-10). Bring coolant to normal operating temperature and then apply a 100% rated load for 30 min (TM 9-6115-749-10).
15. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

REMOVE/INSTALL WATER PUMP

INITIAL SETUP:**Tools and Special Tools**

Hammer, Hand, Soft Face, Dead Blow (WP 0162, Table 2, Item 15)
 Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Personnel Required

91D (1)
 Assistant (1)

References

WP 0076, Remove/Install Battery-Charging Alternator Belt

Materials/Parts

Bolt (1) (WP 0147, Item 15)
 Bolt, flange (4) (WP 0131, Item 10)
 Bolt, machine (5) (WP 0131, Item 1)
 Gasket (1) (WP 0131, Item 3)
 Pump, water (1) (WP 0131, Item 2)
 Antifreeze, ethylene glycol (WP 0163, Table 1, Item 2)
 Cap set, protective (WP 0163, Table 1, Item 8)
 Distilled water (WP 0163, Table 1, Item 17)
 Grease, electrically conductive (WP 0163, Table 1, Item 20)
 Pan, drain (WP 0163, Table 1, Item 28)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool
 Cooling system drained (WP 0021, Service Cooling System)
 Battery ground cable removed (WP 0036, Remove/Install Batteries)
 Access panel removed (WP 0029, Remove/Install Front Body Panel)

REMOVE/INSTALL WATER PUMP**Remove Water Pump**

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate water pump (Figure 1).

REMOVE/INSTALL WATER PUMP – CONTINUED

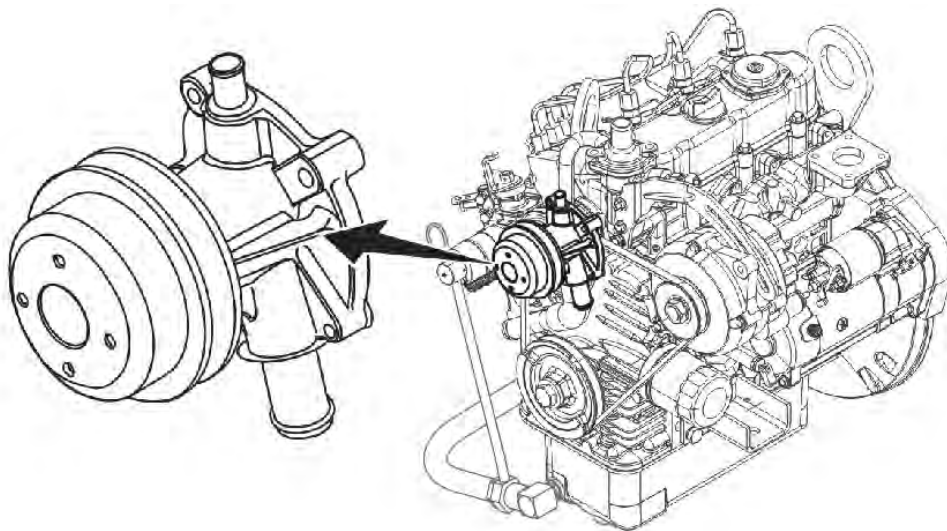


Figure 1. Water Pump - Location.

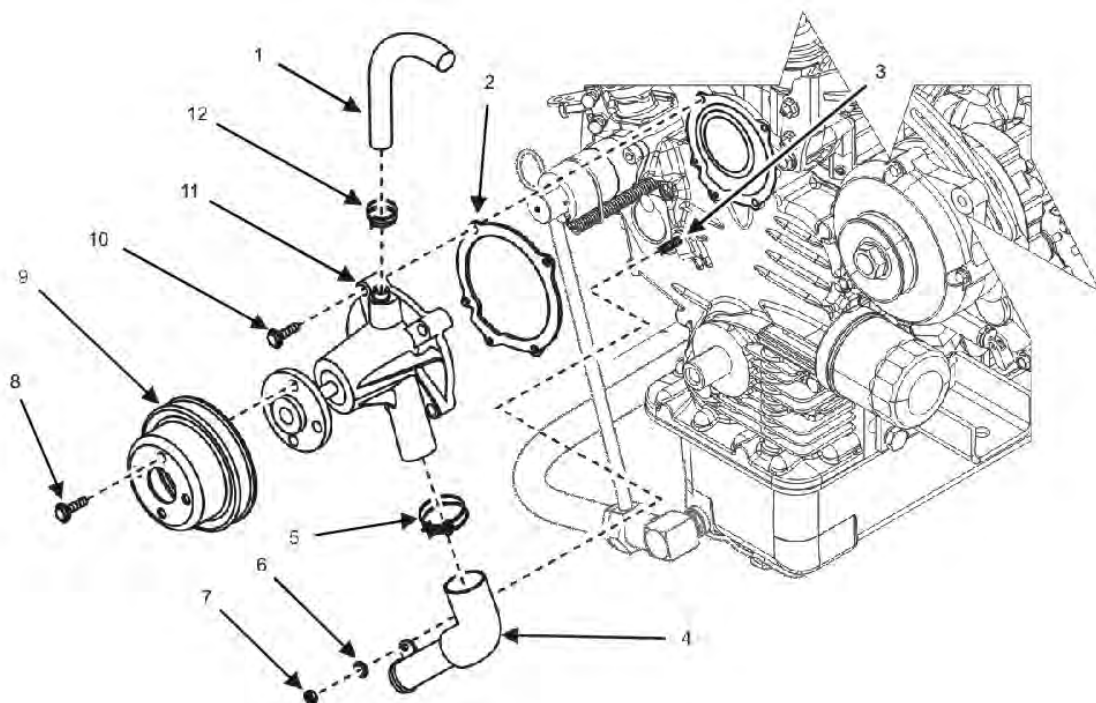


Figure 2. Water Pump - Detail.

3. Inspect flexible water hose (Figure 2, Item 1) for cracks, corrosion, and other damage.
4. Replace flexible water hose (Figure 2, Item 1) if damaged, or set aside for reuse.
5. Disengage hose clamp (Figure 2, Item 5) on lower water hose (Figure 2, Item 4) connection.

REMOVE/INSTALL WATER PUMP – CONTINUED

6. Remove nut (Figure 2, Item 7) and flat washer (Figure 2, Item 6) that secures lower water hose (Figure 2, Item 4) to stud (Figure 2, Item 3) on engine.
7. Remove lower water hose (Figure 2, Item 4) from water pump (Figure 2, Item 11) connection and inspect for cracks, corrosion, and other damage.
8. Replace lower water hose (Figure 2, Item 4) if damaged or set aside for reuse.

NOTE

Battery-Charging alternator belt may help to hold pulley (Figure 2, Item 9) in place while screws are being removed. If belt tension is not strong enough, pulley (Figure 2, Item 9) can be held in place with slip joint pliers while the screws are being removed.

Cap/plug openings in cooling hoses to prevent debris from entering cooling system.

9. Remove four capscrews with captive lockwashers (Figure 2, Item 8) from pulley (Figure 2, Item 9).
10. Remove battery-charging alternator belt (WP 0076, Remove/Install Battery-Charging Alternator Belt) and save for reuse.
11. Remove pulley (Figure 2, Item 9) and save for reuse.

NOTE

Lower left water pump bolt is the longer bolt. The other four are of equal length.

12. Remove and discard five bolts with captive lockwashers (Figure 2, Item 10) from water pump (Figure 2, Item 11) assembly.
13. Remove water pump (Figure 2, Item 11) from engine.
14. Remove and discard water pump gasket (Figure 2, Item 2).
15. Loosen hose clip (Figure 2, Item 12) on flexible water hose (Figure 2, Item 1) connection at water pump (Figure 2, Item 11).
16. Remove flexible water hose (Figure 2, Item 1) from water pump (Figure 2, Item 11) connection.
17. Remove any residual gasket material from engine and water pump (Figure 2, Item 11).

END OF TASK**Inspect Water Pump Assembly**

1. Inspect water pump (Figure 2, Item 11) for cracks, damage, or corrosion and replace as required.
2. Ensure that water pump shaft and impeller rotate freely within water pump housing. Replace water pump (Figure 2, Item 11) if shaft or impeller are obstructed or do not rotate freely.
3. Inspect pulley (Figure 2, Item 9) for cracks or damage and replace as required.

END OF TASK**Install Water Pump****NOTE**

Remove all caps/plugs before installation.

1. Position new water pump gasket (Figure 2, Item 2) onto water pump (Figure 2, Item 11) and align the mounting holes.
2. Position water pump (Figure 2, Item 11) to its location on engine and align the mounting holes.

REMOVE/INSTALL WATER PUMP – CONTINUED**NOTE**

The lower left bolt is the longer water pump bolt. The other four are of equal length.

3. Secure water pump (Figure 2, Item 11) to engine by installing five new bolts with captive lockwashers (Figure 2, Item 10).
4. Install hose clip (Figure 2, Item 12) on flexible water hose (Figure 2, Item 1).
5. Install lower water hose (Figure 2, Item 4) onto water pump (Figure 2, Item 11) and position hose clamp (Figure 2, Item 5).
6. Position lower water hose (Figure 2, Item 4) onto stud (Figure 2, Item 3) and secure by installing flat washer (Figure 2, Item 6) and nut (Figure 2, Item 7).
7. Position pulley (Figure 2, Item 9) assembly on water pump (Figure 2, Item 11).

NOTE

Pulley (Figure 2, Item 9) must be held in place with slip joint pliers or other tool to assist in tightening pulley bolts, or battery-charging alternator belt can be installed to help hold the pulley in place.

8. Secure pulley (Figure 2, Item 9) assembly with four new capscrews with captive lockwashers (Figure 2, Item 8).
9. Tighten hose clamp (Figure 2, Item 5) on lower water hose (Figure 2, Item 4).
10. Install battery-charging alternator belt (WP 0076, Remove/Install Battery-Charging Alternator Belt).
11. Install access panel (WP 0029, Remove/Install Front Body Panel).
12. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
13. Fill cooling system (WP 0021, Service Cooling System).
14. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
15. Start engine and check for proper operation and leaks (TM 9-6115-749-10). Bring coolant to normal operating temperature and then apply a 100% rated load for 30 min (TM 9-6115-749-10).
16. Repair as required.
17. Check coolant level and fill as required (TM 9-6115-749-10).

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**REMOVE/INSTALL BATTERY-CHARGING ALTERNATOR ASSEMBLY**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
Wrench, Torque, Click, Ratcheting, 3/8 in Drive, 75 ft•lb (WP 0162, Table 2, Item 41)
Wrench, Torque, Dial, 3/8 in Drive, 300 in•lb (WP 0162, Table 2, Item 43)

Materials/Parts

Alternator, battery charging (WP 0132, Item 7)
Grease, electrically conductive (WP 0163, Table 1, Item 20)
Rag, wiping (WP 0163, Table 1, Item 31)
Tag, marker (WP 0163, Table 1, Item 35)

Personnel Required

91D (1)
Assistant (1)

References

WP 0018, Repair DCS
WP 0076, Remove/Install Battery-Charging Alternator Belt
WP 0093, General Maintenance
Foldout Pages

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)
Left-side body panel removed (WP 0031, Remove/Install Left-side Body Panel)
Access panel removed (WP 0029, Remove/Install Front Body Panel)

REMOVE/INSTALL BATTERY-CHARGING ALTERNATOR ASSEMBLY**Test Battery-Charging Alternator Assembly****WARNING**

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

WARNING

Hearing protection is required during maintenance or repair with engine running. Failure to comply can cause hearing loss.

WARNING

When operating, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow engine to cool before checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.

REMOVE/INSTALL BATTERY-CHARGING ALTERNATOR ASSEMBLY – CONTINUED**WARNING**

Exhaust discharge contains deadly gases, including carbon monoxide. Exhaust gases are most dangerous in places with poor ventilation. Do not operate generator set in an enclosed area unless exhaust discharge is properly vented. Failure to comply may cause injury or death to personnel.

WARNING

High voltage is produced when generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Do not ground yourself in standing water. Never attempt to connect or disconnect load cables while the generator sets are running. Failure to comply may cause injury or death to personnel.

CAUTION

Operating generator set with doors open or with panels removed for an extended length of time will cause engine to overheat. Do not operate generator with doors open or panels removed for longer than necessary to complete your task. Monitor DCS temperature indicator to prevent engine overheating. Failure to comply will cause damage to equipment.

NOTE

This test is not necessary if you are removing the battery-charging alternator for access to other components.

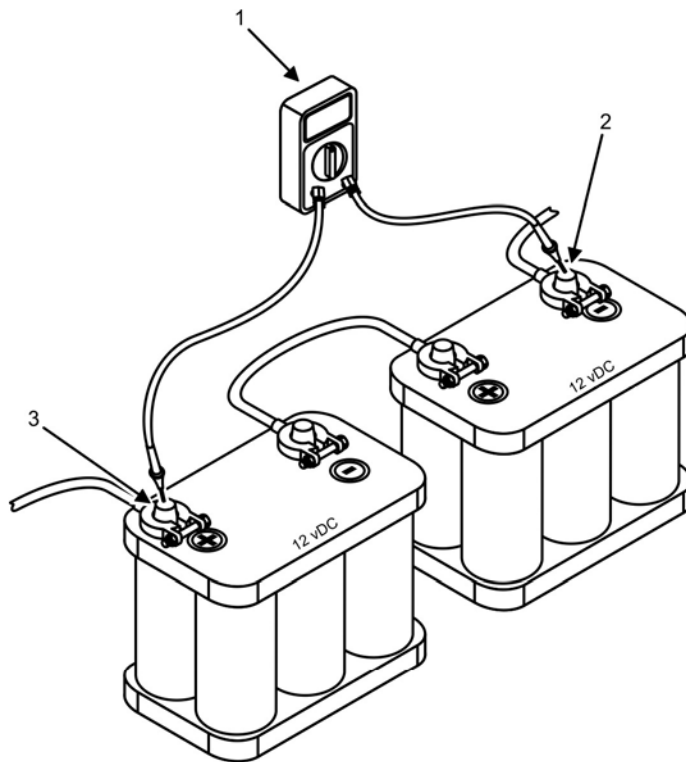


Figure 1. Battery-Charging Alternator - Test.

1. Ensure equipment conditions are met in order presented in initial setup.

REMOVE/INSTALL BATTERY-CHARGING ALTERNATOR ASSEMBLY – CONTINUED

2. Open left-side door.
3. Set the multimeter (Figure 1, Item 1) to measure VDC.
4. Attach multimeter (Figure 1, Item 1) to right-side battery negative terminal (Figure 1, Item 2) and left-side battery positive terminal (Figure 1, Item 3).
5. Record voltage reading displayed on the multimeter (Figure 1, Item 1).
6. Install battery ground cable (WP 0036, Remove/Install Batteries).
7. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
8. Start generator set (TM 9-6115-749-10).
9. Attach multimeter leads to power wire (Figure 3, Item 7) stud (Figure 3, Item 8) and ground screw (Figure 3, Item 4) on battery-charging alternator (Figure 3, Item 1).

NOTE

If voltage at battery-charging alternator (Figure 3, Item 1) with engine operating is not between 26 and 31 VDC range, the battery-charging alternator (Figure 3, Item 1) or field flash wire (Figure 3, Item 5) may be defective. If voltage at battery-charging alternator (Figure 3, Item 1) is within 26 and 31 VDC range, wiring to starter (not shown) can be tested to confirm proper operation (see Step 17).

10. Record voltage reading. Proceed to Step 11 if voltage is not within 26 to 31 VDC range or proceed to Step 17 if voltage is within 26 to 31 VDC range.
11. Shut down generator set (TM 9-6115-749-10).
12. Remove field flash wire (P2-P) (Figure 3, Item 5) and connect multimeter leads from field flash wire (Figure 3, Item 5) to ground screw (Figure 3, Item 4).
13. Use an assistant to start generator set (TM 9-6115-749-10).

CAUTION

Be sure to observe multimeter display throughout entire starting and running of generator set to obtain an accurate reading. Full field flash voltage reading should be observed within 30 seconds of starting. Failure to comply may cause damage to equipment.

NOTE

If voltage reading obtained in Step 14 is the same $\pm 5\%$ as battery voltage reading obtained in Step 5, battery-charging alternator (Figure 3, Item 1) is receiving proper field flash signal from DCS. If voltage reading obtained in Step 14 is not the same $\pm 5\%$ as battery voltage reading obtained in Step 5, field flash wire (Figure 3, Item 5) or DCS may be malfunctioning. See WP 0093, General Maintenance and Foldout Pages to check field flash wire (Figure 3, Item 5) and see WP 0018, Repair DCS to check DCS.

14. Record voltage reading and compare to reading obtained in Step 5.
15. Shut down generator set (TM 9-6115-749-10).
16. Replace battery-charging alternator (Figure 3, Item 1) if voltage recorded in Step 10 is outside 26 to 31 VDC range but field flash wire (Figure 3, Item 5) voltage in Step 14 is the same as battery voltage (Step 5).
17. Attach multimeter (Figure 1, Item 1) to right-side battery negative terminal (Figure 1, Item 2) and left-side battery positive terminal (Figure 1, Item 3).
18. Start generator set (TM 9-6115-749-10).
19. Record voltage reading displayed on the multimeter (Figure 1, Item 1).

REMOVE/INSTALL BATTERY-CHARGING ALTERNATOR ASSEMBLY – CONTINUED

20. Shut down generator set (TM 9-6115-749-10).
21. Test and replace wiring as required (WP 0093 and Foldout Pages) if voltage reading in Step 19 does not match voltage reading $\pm 5\%$ obtained in Step 10.
22. Remove multimeter (Figure 1, Item 1) from battery terminals.
23. Remove battery ground cable (WP 0036, Remove/Install Batteries).
24. Close left-side door.

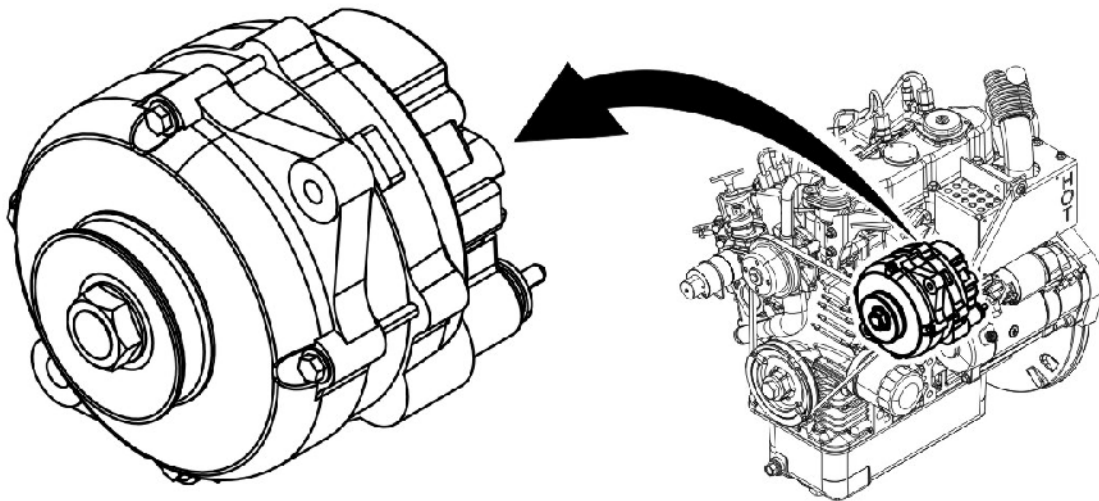
END OF TASK**Remove Battery-Charging Alternator Assembly**

Figure 2. Battery-Charging Alternator - Location.

WARNING

The right-hand battery negative lead that connects directly to the grounding stud must be disconnected prior to disconnecting or removing batteries. Follow procedural steps in exact order given for removal and installation. Failure to comply may cause injury or death to personnel.

NOTE

To aid installation, tag and identify all electrical wires and connectors prior to removal.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Open left-side door.
3. Locate battery-charging alternator (Figure 2).

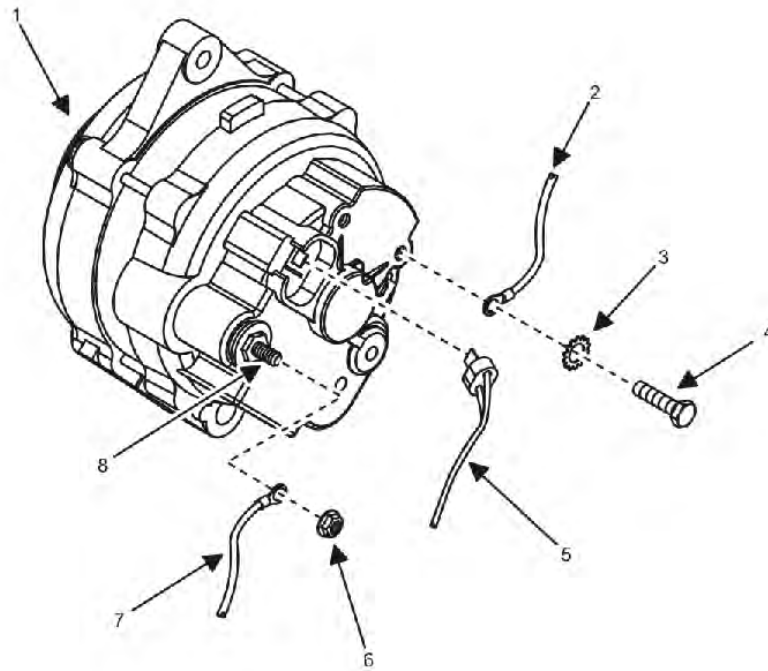
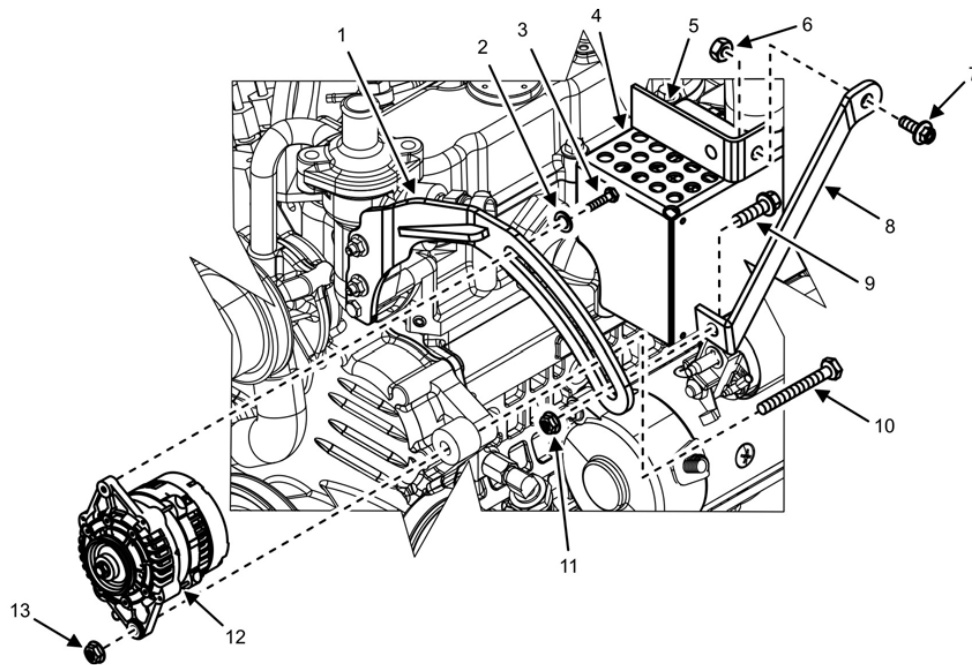
REMOVE/INSTALL BATTERY-CHARGING ALTERNATOR ASSEMBLY – CONTINUED

Figure 3. Battery-Charging Alternator - Wiring.

4. Remove boot (not shown) to expose stud (Figure 3, Item 8) on rear of battery-charging alternator (Figure 3, Item 1).
5. Remove nut (Figure 3, Item 6) and power wire (Figure 3, Item 7) from stud (Figure 3, Item 8).
6. Disconnect field flash wire (Figure 3, Item 5) from rear of battery-charging alternator (Figure 3, Item 1).
7. Remove ground screw (Figure 3, Item 4) and external tooth washer (Figure 3, Item 3) securing ground wire (Figure 3, Item 2) to rear of battery-charging alternator (Figure 3, Item 1).

REMOVE/INSTALL BATTERY-CHARGING ALTERNATOR ASSEMBLY – CONTINUED**Figure 4. Battery-Charging Alternator - Remove/Install.**

8. Loosen nut (Figure 4, Item 13) on mounting bolt (Figure 4, Item 10). Do not remove.
9. Loosen adjustment screw (Figure 4, Item 3), slide battery-charging alternator (Figure 4, Item 12) inward, and remove battery-charging alternator belt (not shown) from pulley on battery-charging alternator (Figure 4, Item 12).
10. Remove bolt (Figure 4, Item 9) and nut (Figure 4, Item 11) securing alternator support bracket (Figure 4, Item 8) to adjustment bracket (Figure 4, Item 1).
11. Remove bolt (Figure 4, Item 7) and nut (Figure 4, Item 6) securing alternator support bracket (Figure 4, Item 8) to heat shield alternator bracket (Figure 4, Item 5) located on top of heat shield (Figure 4, Item 4).
12. Remove alternator support bracket (Figure 4, Item 8).
13. Remove adjustment screw (Figure 4, Item 3) and flat washer (Figure 4, Item 2) from battery-charging alternator (Figure 4, Item 12) and adjustment bracket (Figure 4, Item 1).
14. Support battery-charging alternator (Figure 4, Item 12) and remove nut (Figure 4, Item 13) from mounting bolt (Figure 4, Item 10).
15. Remove battery-charging alternator (Figure 4, Item 13) from engine and place on a suitable work surface.
16. Inspect mounting bolt (Figure 4, Item 10) for obvious signs of damage.
17. Remove mounting bolt (Figure 4, Item 10) from engine only if damaged. Otherwise, leave installed.

END OF TASK**Inspect Battery-Charging Alternator Assembly**

1. Inspect battery-charging alternator (Figure 4, Item 12) for signs of obvious damage.
2. Replace damaged battery-charging alternator (Figure 4, Item 12).

REMOVE/INSTALL BATTERY-CHARGING ALTERNATOR ASSEMBLY – CONTINUED

3. Inspect adjustment bracket (Figure 4, Item 1), alternator support bracket (Figure 4, Item 8), and heat shield alternator bracket (Figure 4, Item 5) for signs of obvious damage.
4. Replace damaged adjustment bracket (Figure 4, Item 1), alternator support bracket (Figure 4, Item 8), and heat shield alternator bracket (Figure 4, Item 5) as required.

END OF TASK**Install Battery-Charging Alternator Assembly****NOTE**

Remove tags from wires and connectors only after generator set is operating properly.

Mounting bolt installation is necessary only if the mounting bolt was removed because of damage.

1. Install mounting bolt (Figure 4, Item 10) to its mounting position on engine.
2. Support and install battery-charging alternator (Figure 4, Item 12) onto mounting bolt (Figure 4, Item 10).
3. Install nut (Figure 4, Item 13) onto mounting bolt (Figure 4, Item 10) finger-tight to secure battery-charging alternator (Figure 4, Item 12).
4. Position battery-charging alternator (Figure 4, Item 12) to adjustment bracket (Figure 4, Item 1) and install adjustment screw (Figure 4, Item 3) and flat washer (Figure 4, Item 2) through adjustment bracket (Figure 4, Item 1) and into battery-charging alternator (Figure 4, Item 12). Do not tighten.
5. Install bolt (Figure 4, Item 7) and nut (Figure 4, Item 6) to secure alternator support bracket (Figure 4, Item 8) to heat shield alternator bracket (Figure 4, Item 5).
6. Install bolt (Figure 4, Item 9) and nut (Figure 4, Item 11) to secure alternator support bracket (Figure 4, Item 8) to adjustment bracket (Figure 4, Item 1).
7. Torque bolts (Figure 4, Items 7, 9, and 10) to 18-21 ft•lb (24-29 N•m).
8. Install and adjust battery-charging alternator belt (WP 0076, Remove/Install Battery-Charging Alternator Belt).
9. Torque nut (Figure 4, Item 13) to bolt (Figure 4, Item 10) to 28-35 ft•lb (38-47 N•m). Torque adjustment screw (Figure 4, Item 3) to 17-21 ft•lb (24-29 N•m).
10. Install ground screw (Figure 3, Item 4) and external tooth washer (Figure 3, Item 3) through ground wire (Figure 3, Item 2) connector and secure to rear of battery-charging alternator (Figure 3, Item 1).
11. Torque ground screw (Figure 3, Item 4) to 26-32 in•lb (3.0-3.6 N•m).
12. Apply electrically conductive grease to the connector on field flash wire (Figure 3, Item 5).
13. Connect field flash wire (Figure 3, Item 5) to rear of battery-charging alternator (Figure 3, Item 1).
14. Install power wire (Figure 3, Item 7) onto stud (Figure 3, Item 8) on rear of battery-charging alternator (Figure 3, Item 1).
15. Install nut (Figure 3, Item 6) to secure power wire (Figure 3, Item 7) to stud (Figure 3, Item 8).
16. Torque nut (Figure 3, Item 6) to 91-110 in•lb (10-12 N•m).
17. Cover stud (Figure 3, Item 8) with boot (not shown).
18. Install access panel (WP 0029, Remove/Install Front Body Panel).
19. Install left-side body panel (WP 0031, Remove/Install Left-Side Body Panel).
20. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).

REMOVE/INSTALL BATTERY-CHARGING ALTERNATOR ASSEMBLY – CONTINUED

21. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
22. Start engine and check for proper operation (TM 9-6115-749-10).
23. Repair as required.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE**REMOVE/INSTALL BATTERY-CHARGING ALTERNATOR BELT**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
Wrench, Torque, Click, Ratcheting, 3/8 in Drive, 75 ft•lb (WP 0162, Table 2, Item 41)

Personnel Required

91D (1)

References

WP 0075, Remove/Install Battery-Charging Alternator Assembly

Materials/Parts

Belt, V (WP 0132, Item 8)
Cleaning compound, solvent (WP 0163, Table 1, Item 10)
Grease, electrically conductive (WP 0163, Table 1, Item 20)
Rag, wiping (WP 0163, Table 1, Item 31)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)
Access panel removed (WP 0029, Remove/Install Front Body Panel)

REMOVE/INSTALL BATTERY-CHARGING ALTERNATOR BELT**WARNING**

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow engine to cool before checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.

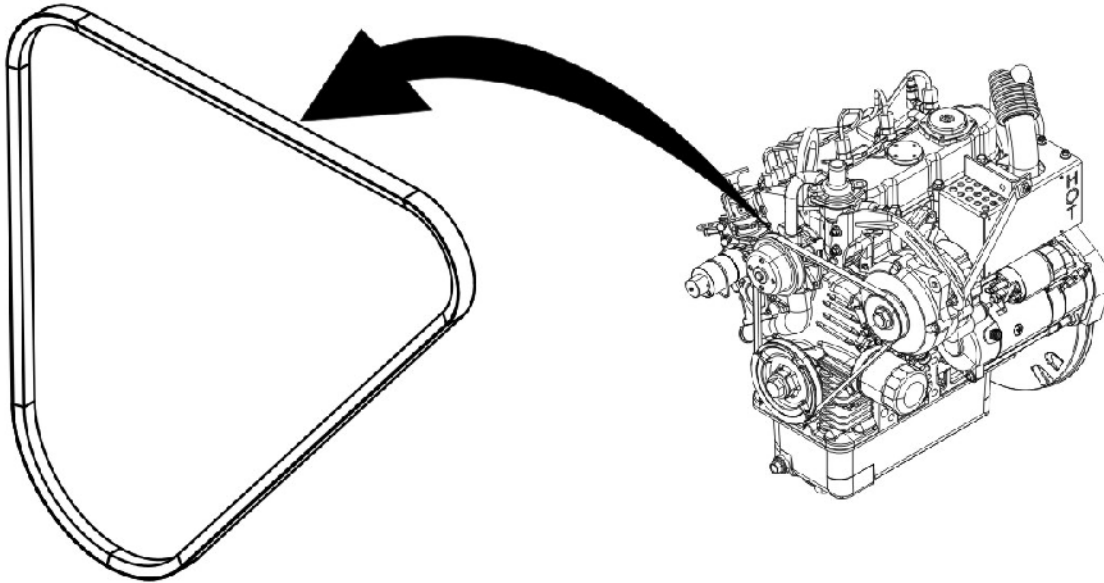
REMOVE/INSTALL BATTERY-CHARGING ALTERNATOR BELT – CONTINUED**Remove Battery-Charging Alternator Belt**

Figure 1. Battery-Charging Alternator Belt - Location.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate battery-charging alternator belt (Figure 1).

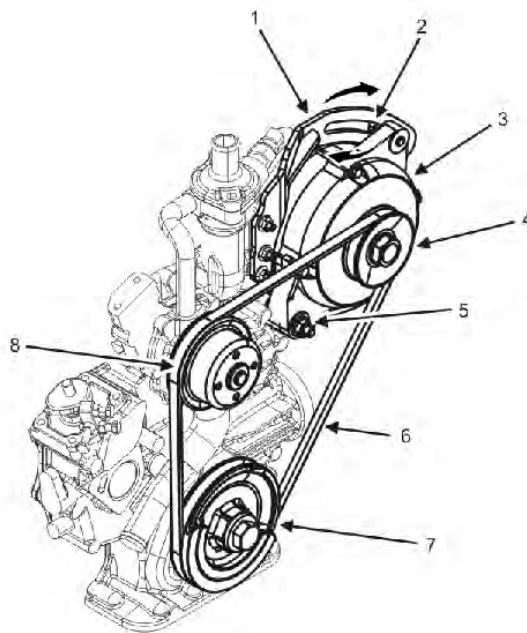


Figure 2. Battery-Charging Alternator Belt - Removal.

REMOVE/INSTALL BATTERY-CHARGING ALTERNATOR BELT – CONTINUED

3. Loosen screw (Figure 2, Item 2) that secures battery-charging alternator (Figure 2, Item 3) to upper mounting bracket (Figure 2, Item 1).
4. Loosen nut (Figure 2, Item 5) that secures battery-charging alternator (Figure 2, Item 3) to engine.
5. Push battery-charging alternator (Figure 2, Item 3) toward engine to slacken tension on battery-charging alternator belt (Figure 2, Item 6).
6. Slide battery-charging alternator belt (Figure 2, Item 6) from battery-charging alternator pulley (Figure 2, Item 4).
7. Remove battery-charging alternator belt (Figure 2, Item 6) from other pulleys and clear of unit.

END OF TASK**Inspect Battery-Charging Alternator Belt**

1. Inspect water pump pulley (Figure 2, Item 8), crankshaft pulley (Figure 2, Item 7), and battery-charging alternator pulley (Figure 2, Item 4) for damage. Replace components as required.
2. Inspect battery-charging alternator (Figure 2, Item 3) for damage. Replace as required (WP 0075, Remove/Install Battery-Charging Alternator Assembly).
3. Inspect battery-charging alternator belt (Figure 2, Item 6) for wear, cracks, or damage. Replace as required.

WARNING

Compound cleaning solvent is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection is required. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply may cause injury or death to personnel.

4. Clean oil, grease, dirt and debris from water pump pulley (Figure 2, Item 8), crankshaft pulley (Figure 2, Item 7), and battery-charging alternator pulley (Figure 2, Item 4) using compound cleaning solvent and wiping rags.

END OF TASK

REMOVE/INSTALL BATTERY-CHARGING ALTERNATOR BELT – CONTINUED

Install Battery-Charging Alternator Belt

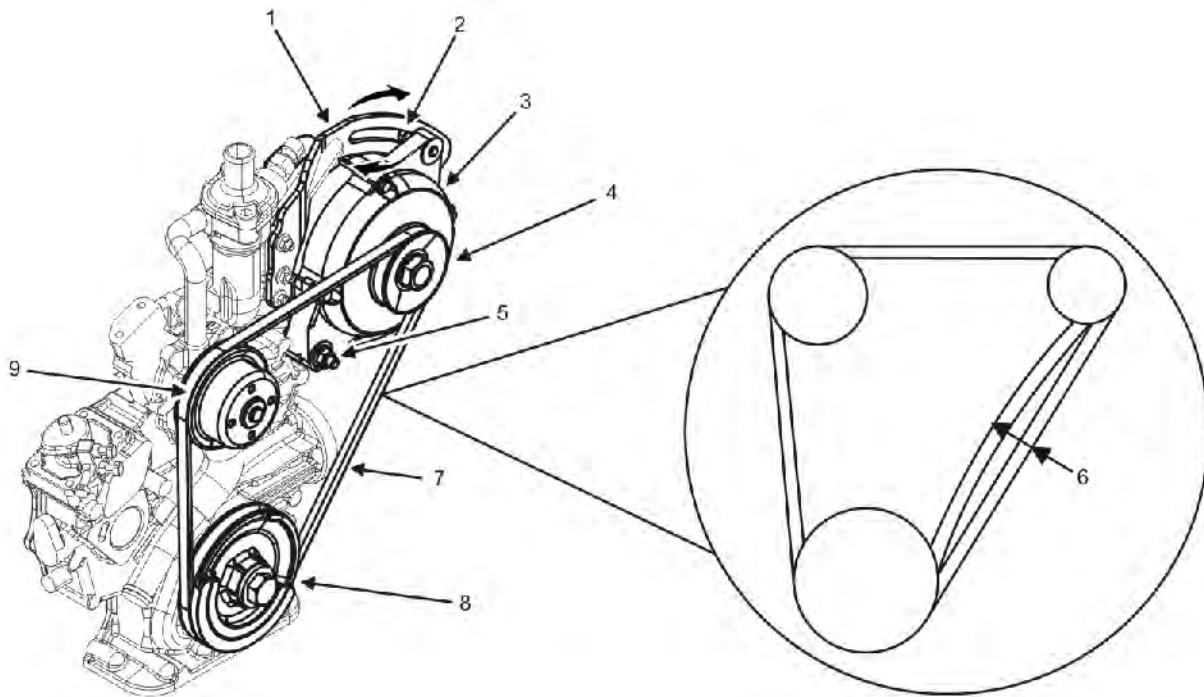


Figure 3. Battery-Charging Alternator Belt - Install.

1. Position battery-charging alternator belt (Figure 3, Item 7) around crankshaft pulley (Figure 3, Item 8) and water pump pulley (Figure 3, Item 9).
2. Push battery-charging alternator (Figure 3, Item 3) toward engine to allow battery-charging alternator belt (Figure 3, Item 7) to be installed around battery-charging alternator pulley (Figure 3, Item 4).
3. Release battery-charging alternator (Figure 3, Item 3) and allow it to assume its natural position on battery-charging alternator belt (Figure 3, Item 7).
4. Pull battery-charging alternator (Figure 3, Item 3) away from engine until battery-charging alternator belt (Figure 3, Item 7) appears to be tight.
5. Tighten screw (Figure 3, Item 2) to lock battery-charging alternator (Figure 3, Item 3) in position on upper mounting bracket (Figure 3, Item 1).

NOTE

Instructions are given for checking belt deflection between the battery-charging alternator and the harmonic balancer pulley. Belt deflection can also be checked between the water pump and battery-charging alternator. Apply moderate pressure to center of battery-charging alternator belt (Figure 3, Item 7) between battery-charging alternator pulley (Figure 3, Item 4) and crankshaft pulley (Figure 3, Item 8) to deflect battery-charging alternator belt (Figure 3, Item 7) inward.

6. Check belt deflection (Figure 3, Item 6) with machinist's rule and compare belt deflection with values in Table 1. A used belt is defined as a belt that has been installed on a running engine for 5 min or more.

REMOVE/INSTALL BATTERY-CHARGING ALTERNATOR BELT – CONTINUED**Table 1. Belt Deflection.**

DEFLECTION CHECK POSITION	NEW BELT DEFLECTION	USED BELT DEFLECTION
Between battery-charging alternator and crankshaft	0.31-0.44 in (8-12 mm)	0.37-0.50 in (10-14 mm)
Between water pump and battery-charging alternator	0.19-0.31 in (5-8 mm)	0.25-0.37 in (7-10 mm)
Between water pump and crankshaft	0.25-0.44 in (7-11 mm)	0.31-0.50 in (9-13 mm)

NOTE

Belt adjustment is not necessary if belt deflection is within specification.

7. Adjust battery-charging alternator belt deflection (Figure 3, Item 6) if belt deflection (Figure 3, Item 6) is outside of specification.
8. Loosen screw (Figure 3, Item 2) from upper mounting bracket (Figure 3, Item 1).
9. Loosen nut (Figure 3, Item 5) that secures battery-charging alternator (Figure 3, Item 3) to engine.

CAUTION

When adjusting battery-charging alternator belt tension, apply pressure to battery-charging alternator housing when prying. Do not pry on battery-charging alternator pulley. Prying on battery-charging alternator pulley may cause damage to the battery-charging alternator. Failure to comply may cause damage to equipment.

10. Adjust belt deflection (Figure 3, Item 6) by prying battery-charging alternator (Figure 3, Item 3) away from engine until battery-charging alternator belt deflection (Figure 3, Item 6) is within specification.
11. Tighten screw (Figure 3, Item 2) to lock battery-charging alternator (Figure 3, Item 3) in position on upper mounting bracket (Figure 3, Item 1).
12. Repeat Steps 8 through 11 to check belt deflection until proper tension is achieved.
13. Torque lower mounting nut (Figure 3, Item 5) to 28-35 ft•lb (38-47 N•m).
14. Torque upper mounting screw (Figure 3, Item 2) to 18-21 ft•lb (24-29 N•m).
15. Install front access panel (WP 0029, Remove/Install Front Body Panel).
16. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
17. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
18. Start engine and check for proper operation (TM 9-6115-749-10).
19. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

REMOVE/INSTALL STARTER

INITIAL SETUP:**Tools and Special Tools**

Crowfoot Attachment Set, Socket Wrench, Flare
 Nut, Metric (WP 0162, Table 2, Item 12)
 Tool Kit, General Mechanic's (GMTK) (WP 0162,
 Table 2, Item 33)
 Wrench, Torque, Click, Ratcheting, 3/8 in Drive, 75
 ft•lb (WP 0162, Table 2, Item 41)
 Wrench, Torque, Dial, 3/8 in Drive, 300 in•lb (WP
 0162, Table 2, Item 43)

Personnel Required - cont'd

Assistant (1)

References

WP 0036, Remove/Install Batteries
 WP 0061, Remove/Install Relay Panel
 WP 0093, General Maintenance
 WP 0080, Remove/Install Exhaust Manifold
 Foldout Pages

Materials/Parts

Motor, starter, 24 volt (WP 0133, Item 1)
 Grease, electrically conductive (WP 0163, Table
 1, Item 20)
 Tag, marker (WP 0163, Table 1, Item 35)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP
 0005)
 Engine cool

Personnel Required

91D (1)

REMOVE/INSTALL STARTER**WARNING**

NATO slave receptacle is electrically live at all times and is not protected by a fuse. Disconnecting the main DC circuit breaker does not ensure the circuit is dead. This circuit is only dead when the batteries are fully disconnected. Disconnect both batteries before performing maintenance on the slave receptacle. Failure to comply may cause injury or death to personnel.

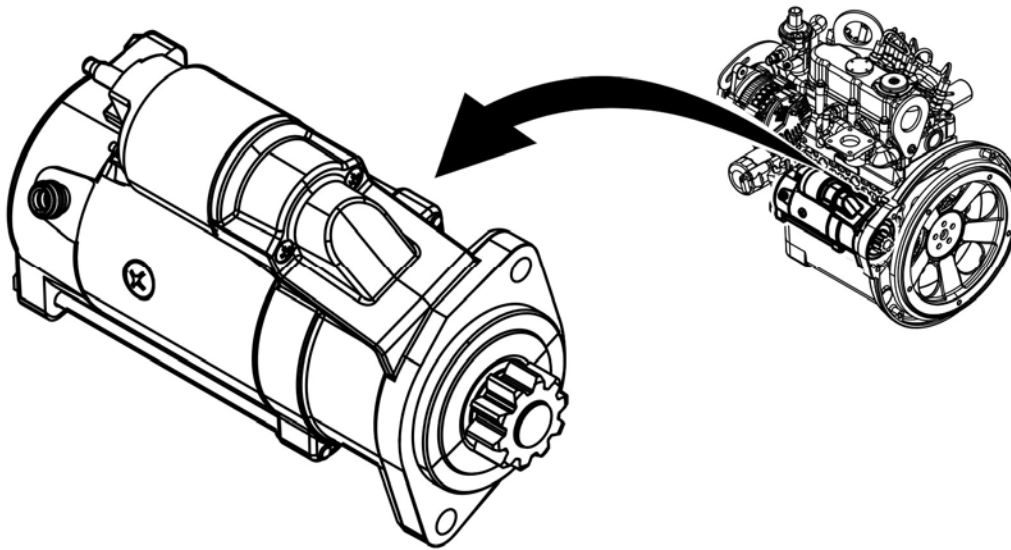
WARNING

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

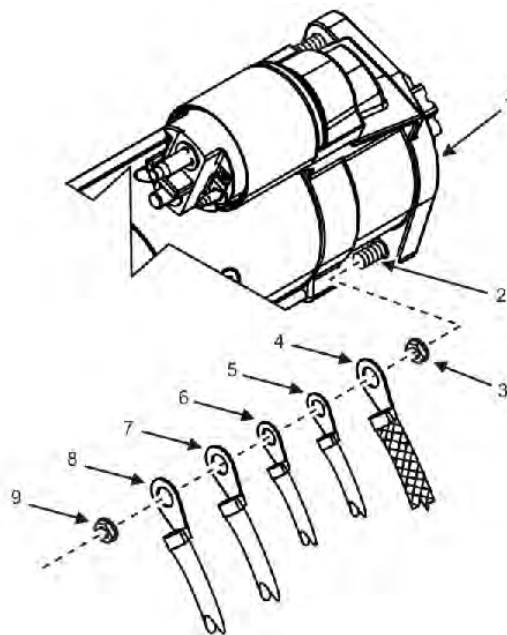
Remove Starter Assembly**NOTE**

Identify and tag or mark all electrical wires and connectors prior to removal to aid at installation.

REMOVE/INSTALL STARTER – CONTINUED

**Figure 1. Starter Assembly - Location.**

1. Ensure equipment conditions are met in order presented in initial setup.
2. Remove right-side battery (WP 0036, Remove/Install Batteries).
3. Remove heat shield from exhaust manifold (WP 0080, Remove/Install Exhaust Manifold).
4. Locate starter on exhaust-side of engine (Figure 1).

**Figure 2. Starter - Lower Mounting Starter Stud.**

REMOVE/INSTALL STARTER – CONTINUED**NOTE**

One of the white wires (Figure 2, Items 5 and 6) could be grounded to the upper mounting stud (Figure 3, Item 8) and may need to be removed after nut (Figure 3, Item 6) is removed from upper mounting stud (Figure 3, Item 8).

5. Reposition boot on black wire (Figure 2, Item 8) to expose nut (Figure 2, Item 9) on lower mounting stud (Figure 2, Item 2).
6. Remove nut (Figure 2, Item 9) from lower mounting stud (Figure 2, Item 2).
7. Remove two black wires (Figure 2, Items 7 and 8) from lower mounting stud (Figure 2, Item 2).
8. Remove two white wires (Figure 2, Items 5 and 6) from lower mounting stud (Figure 2, Item 2).
9. Remove braided ground strap (Figure 2, Item 4) from lower mounting stud (Figure 2, Item 2).
10. Remove a second nut (Figure 2, Item 3) from lower mounting stud (Figure 2, Item 2) securing starter (Figure 2, Item 1) to engine.
11. Loosen oil pressure sensor and reposition for clearance to disconnect wiring harness.

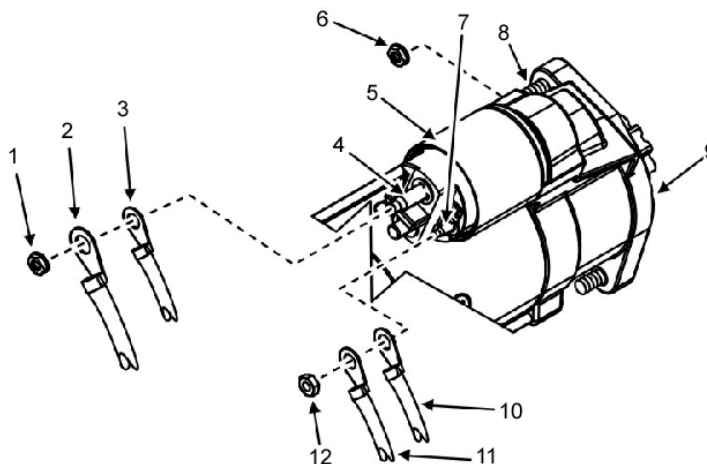


Figure 3. Starter Solenoid.

12. Reposition boot on black wire (Figure 3, Item 2) to expose nut (Figure 3, Item 1).
13. Remove nut (Figure 3, Item 1) and black wire (Figure 3, Item 2) from upper solenoid stud (Figure 3, Item 4) of starter solenoid (Figure 3, Item 5).
14. Remove white wire (Figure 3, Item 3) from upper solenoid stud (Figure 3, Item 4).
15. Reposition boot on white wire (Figure 3, Item 11) to expose nut (Figure 3, Item 12).
16. Remove nut (Figure 3, Item 12) from right-side solenoid stud (Figure 3, Item 7).
17. Remove two white wires (Figure 3, Items 10 and 11) from right-side solenoid stud (Figure 3, Item 7).
18. Support starter (Figure 3, Item 9) from underneath.

NOTE

One of the white wires (Figure 2, Items 5 and 6) could be grounded to the upper mounting stud (Figure 3, Item 8) and may need to be removed after nut (Figure 3, Item 6) is removed from upper mounting stud (Figure 3, Item 8).

19. Remove nut (Figure 3, Item 6) from upper mounting stud (Figure 3, Item 8).

REMOVE/INSTALL STARTER – CONTINUED

20. Remove starter (Figure 3, Item 9) from engine and generator set.
21. Place starter (Figure 3, Item 9) on a suitable work surface.

END OF TASK**Inspect Starter**

1. Inspect all wires and connectors for damage, fraying, or corrosion.
2. Replace any damaged wire or connector (WP 0093, General Maintenance).
3. Inspect starter (Figure 3, Item 9) for signs of obvious damage. Replace damaged starter (Figure 3, Item 9).
4. Inspect lower mounting stud (Figure 2, Item 2) and upper mounting stud (Figure 3, Item 8) for damaged threads, excessive wear, or corrosion. Replace as required.

END OF TASK**Install Starter**

1. Position starter (Figure 3, Item 9) to lower mounting stud (Figure 2, Item 2) and upper mounting stud (Figure 3, Item 8) on exhaust-side of engine.
2. Install nut (Figure 3, Item 6) to upper mounting stud (Figure 3, Item 8) finger-tight.
3. Install nut (Figure 2, Item 3) to lower mounting starter stud (Figure 2, Item 2) finger-tight.
4. Torque lower and upper starter mounting nuts to 38-42 ft•lb (51.7-57 N•m) with a crowfoot wrench head.

NOTE

Use tags and markings applied during removal as guides at installation. Leave tags and markings in place until installation is complete and generator set is operating properly.

5. Install two white wires (Figure 3, Items 10 and 11) to right-side solenoid stud (Figure 3, Item 7) using tags and markings applied at removal as a guide.
6. Install nut (Figure 3, Item 12) to right-side solenoid stud (Figure 3, Item 7). Torque nut (Figure 3, Item 12) to 26-32 in•lb (3.0-3.6 N•m).
7. Position boot of white wire (Figure 3, Item 11) to cover nut (Figure 3, Item 12).
8. Install white wire (Figure 3, Item 3) to upper solenoid stud (Figure 3, Item 4) using tag and marking applied at removal as a guide.
9. Install black wire (Figure 3, Item 2) to upper solenoid stud (Figure 3, Item 4) using tag and marking applied at removal as a guide.
10. Install nut (Figure 3, Item 1) to upper solenoid stud (Figure 3, Item 4). Torque nut (Figure 3, Item 1) to 106-133 in•lb (12-15 N•m).
11. Position boot of black wire (Figure 3, Item 2) to cover nut (Figure 3, Item 1).
12. Reposition and tighten oil pressure sensor.
13. Install braided ground strap (Figure 2, Item 4) to lower mounting stud (Figure 2, Item 2) using tags and markings applied at removal as a guide.
14. Install two white wires (Figure 2, Items 5 and 6) and two black wires (Figure 2, Items 7 and 8) to lower mounting stud (Figure 2, Item 2) using tags and markings applied at removal as a guide.
15. Install nut (Figure 2, Item 9) to lower mounting stud (Figure 2, Item 2).
16. Install heat shield to exhaust manifold (WP 0080, Remove/Install Exhaust Manifold).

REMOVE/INSTALL STARTER – CONTINUED

17. Install right-side battery and battery ground cable (WP 0036, Remove/Install Batteries).
18. Close left-side door.
19. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
20. Start engine and check for proper operation (TM 9-6115-749-10).
21. Repair as required.

END OF TASK**Test Starter**

1. Ensure equipment conditions are met in order presented in initial setup.
2. Open left-side door.

NOTE

When DCS indicates batteries are charged but engine will not crank, check for battery current at starter solenoid (Figure 3, Item 5).

3. Check control wire (white wire) (Figure 3, Item 11) at terminal (right-side solenoid stud) (Figure 3, Item 7) for approximately 24 VDC (not less than 20.0 VDC) by attaching the positive lead of the multimeter to control wire (white wire) (Figure 3, Item 11) and the negative lead to upper mounting stud (Figure 3, Item 8) while assistant operates the DEAD CRANK SWITCH (TM 9-6115-749-10).
4. With help from assistant, turn DEAD CRANK SWITCH to CRANK. Watch for rotation of harmonic balancer at front of engine, indicating starter is operational.
5. Listen for clicking and spinning sounds at starter solenoid (Figure 3, Item 5) when DEAD CRANK SWITCH is in the CRANK position and engine does not crank.

NOTE

When starter diode wire is tested, the multimeter should indicate a high resistance in one direction and a low resistance with the leads reversed. If the diode is shorted, the multimeter will indicate approximately zero resistance with the multimeter leads in either direction. If the diode is open, the multimeter will indicate infinite resistance or greater than 100 k Ω with the multimeter leads in either direction. If starter diode wire is found to be defective by way of a short during the test in Step 6, relays K11 and K10 must be checked in relay panel for proper function (WP 0061, Remove/Install Relay Panel).

6. Using a multimeter set to test ohms (Ω) (WP 0093, General Maintenance), check starter diode wire (Fold-out Pages) for proper resistance. If clicking and spinning sounds are not heard at starter solenoid (Figure 3, Item 5) in Step 5, replace diode wire as required.
7. Replace starter (Figure 3, Item 9) if clicking and spinning sounds are not heard at starter solenoid (Figure 3, Item 5) and starter diode wire is not defective.
8. Close left-side door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
REMOVE/INSTALL GOVERNOR ACTUATOR

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Personnel Required

91D (1)

Materials/Parts

Governor actuator (WP 0134, Item 2)
Gasket, actuator (WP 0134, Item 3)
Cap set, protective (WP 0163, Table 1, Item 8)
Grease, electrically conductive (WP 0163, Table 1, Item 20)
Lubricating oil, engine (WP 0163, Table 1, Item 23)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)
Front body panel removed (WP 0029, Remove/Install Front Body Panel)

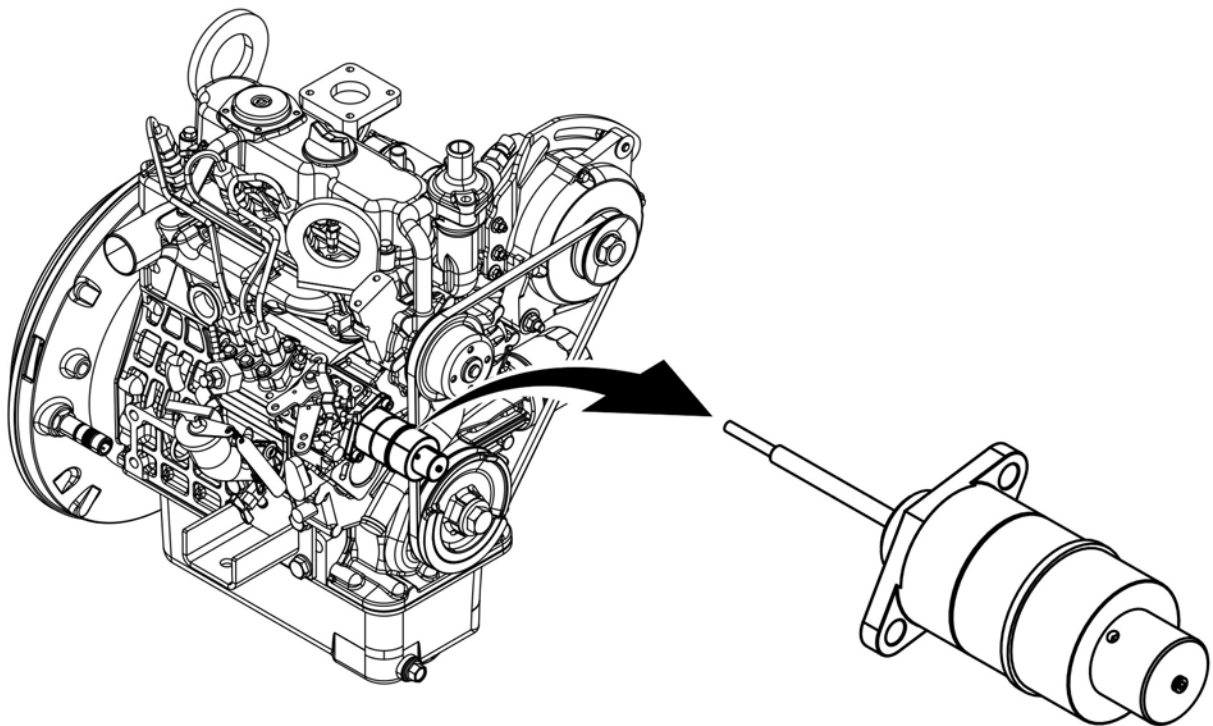
REMOVE/INSTALL GOVERNOR ACTUATOR**Remove Governor Actuator**

Figure 1. Governor Actuator - Location.

1. Ensure equipment conditions are met in order presented in initial setup.

REMOVE/INSTALL GOVERNOR ACTUATOR – CONTINUED

2. Locate governor actuator (Figure 1).

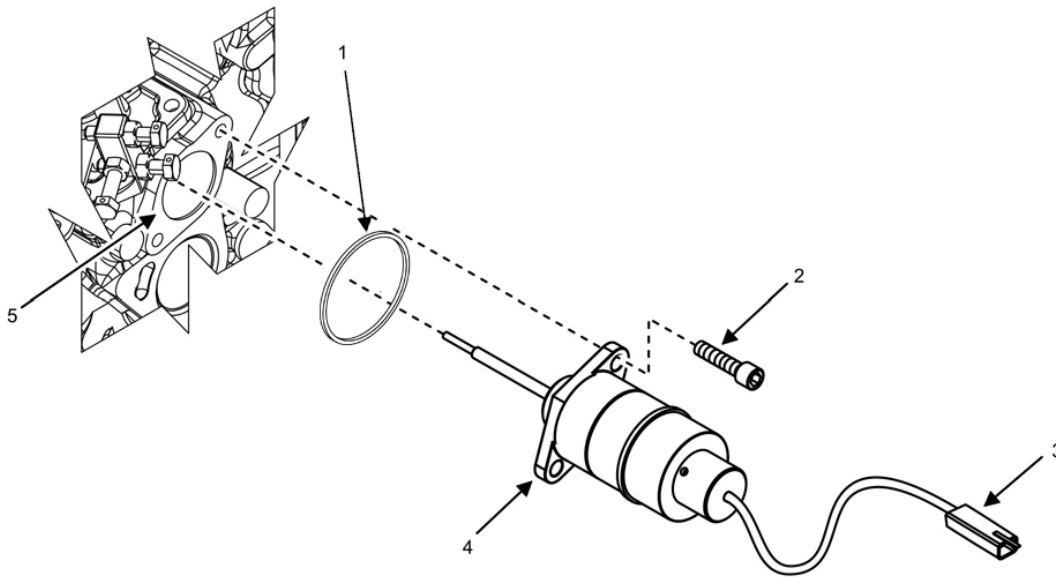


Figure 2. Governor Actuator - Removal Details.

3. Remove wiring harness (not shown) from governor actuator pigtail (Figure 2, Item 3).
4. Remove two socket head screws (Figure 2, Item 2) securing governor actuator (Figure 2, Item 4) to engine.

CAUTION

Use caution when removing governor actuator. Slowly pull straight from the engine to avoid bending probe on governor actuator. Failure to comply may cause damage to equipment.

5. Remove governor actuator (Figure 2, Item 4) from engine.
6. Remove and discard governor actuator gasket (Figure 2, Item 1) from engine.
7. Cap/plug governor actuator opening (Figure 2, Item 5) in engine to prevent dirt and debris from entering engine.

END OF TASK**Inspect Governor Actuator**

1. Inspect governor actuator (Figure 2, Item 4) for bent probe or other signs of obvious damage.
2. Replace damaged governor actuator (Figure 2, Item 4).
3. Remove any residual gasket (Figure 2, Item 1) material from mounting surface on engine.

END OF TASK**Install Governor Actuator**

1. Remove cap/plug from opening in engine.
2. Install new governor actuator gasket (Figure 2, Item 1) to its mounting location on engine.

REMOVE/INSTALL GOVERNOR ACTUATOR – CONTINUED**CAUTION**

Use caution when installing governor actuator. Install governor slowly and straight into engine to prevent bending probe on governor actuator. Failure to comply may cause damage to equipment.

3. Position governor actuator (Figure 2, Item 4) to its mounting location on engine.
4. Secure governor actuator (Figure 2, Item 4) to engine by installing two socket head screws (Figure 2, Item 2).
5. Attach wiring harness (not shown) to governor actuator pigtail (Figure 2, Item 3).
6. Install front body panel (WP 0029, Remove/Install Front Body Panel).
7. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
8. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
9. Start engine and check for proper operation (TM 9-6115-749-10). Bring coolant to normal operating temperature and then apply a 100% rated load for 30 min (TM 9-6115-749-10).
10. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
REMOVE/INSTALL INTAKE MANIFOLD

INITIAL SETUP:**Test Equipment**

Load Bank (WP 0162, Table 2, Item 2)

Tools and Special Tools

Hammer, Hand, Soft Face, Dead Blow (WP 0162, Table 2, Item 15)

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Wrench, Torque, Click, Ratcheting, 3/8 in Drive, 75 ft•lb (WP 0162, Table 2, Item 41)

Materials/Parts

Assembly, intake manifold (WP 0135, Item 1)

Bolt (5) (WP 0135, Item 4)

Gasket, intake manifold (WP 0135, Item 3)

Grease, electrically conductive (WP 0163, Table 1, Item 20)

Materials/Parts - cont'd

Rag, wiping (WP 0163, Table 1, Item 31)

Personnel Required

91D (1)

Assistant (1)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)

Engine cool

Battery ground cable removed (WP 0036, Remove/Install Batteries)

Top body panel removed (WP 0028, Remove/Install Top Body Panel)

Fuel injection lines removed (WP 0069, Remove/Install Fuel Injector)

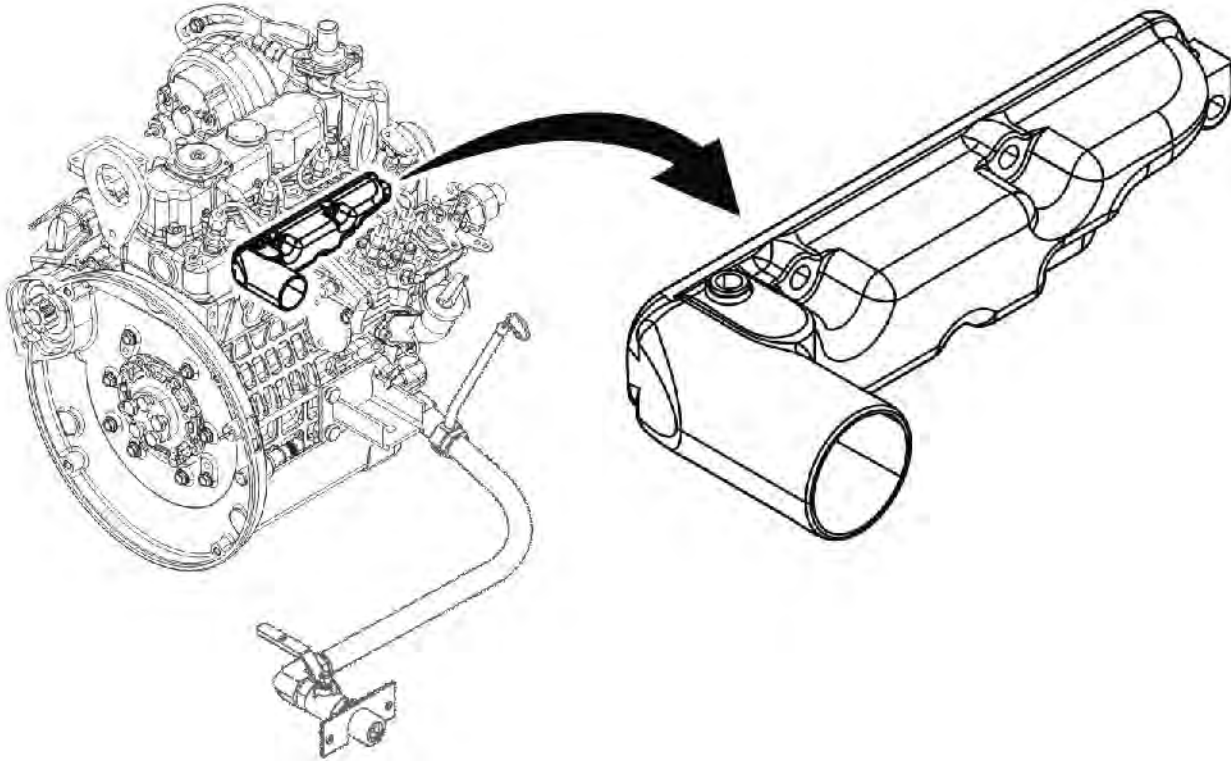
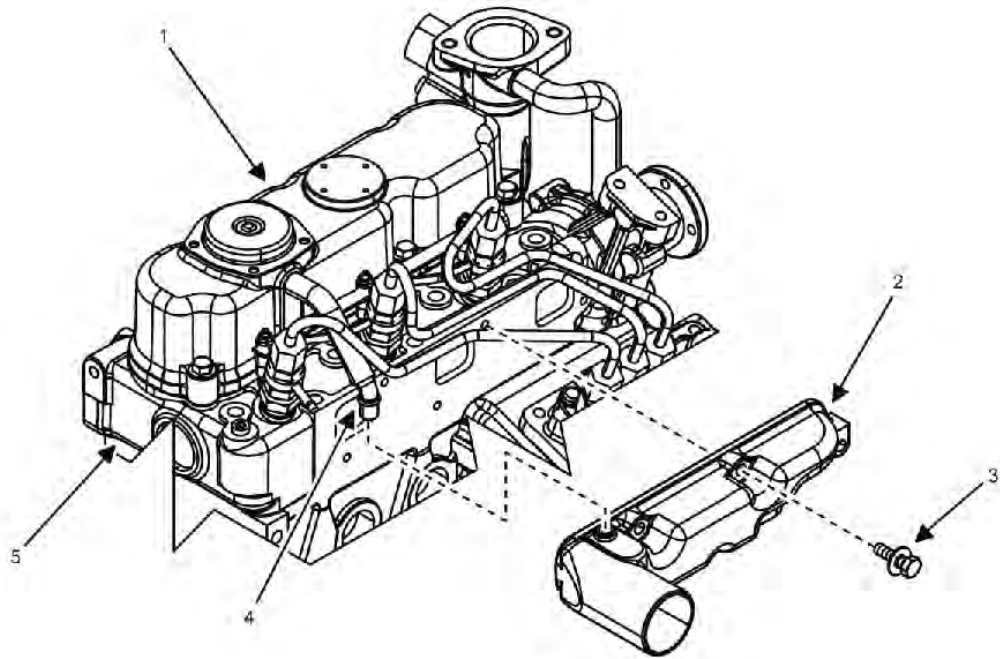
REMOVE/INSTALL INTAKE MANIFOLD**Remove Intake Manifold**

Figure 1. Intake Manifold - Location.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Open right-side door on generator set.
3. Locate intake manifold (Figure 1).

REMOVE/INSTALL INTAKE MANIFOLD – CONTINUED**Figure 2. Intake Manifold - Details.**

4. Disengage clips securing breather hose (Figure 2, Item 4) between valve cover (Figure 2, Item 1) and intake manifold (Figure 2, Item 2).
5. Remove breather hose (Figure 2, Item 4) with clips attached. Inspect breather hose (Figure 2, Item 4) for damage and replace as required.
6. Remove and discard five bolts with captive lockwashers (Figure 2, Item 3) securing intake manifold (Figure 2, Item 2) to cylinder head (Figure 2, Item 5). Discard five bolts with captive lockwashers (Figure 2, Item 3).

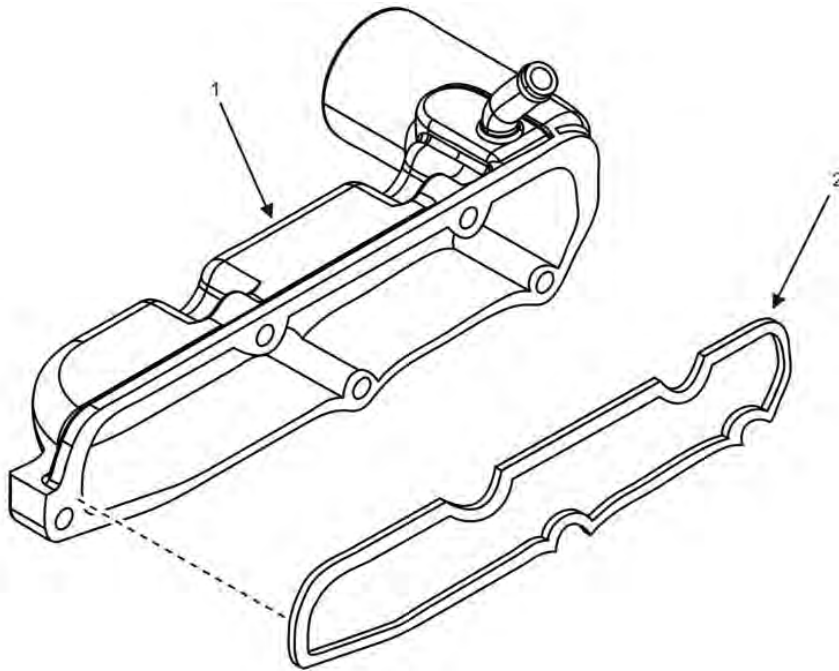
REMOVE/INSTALL INTAKE MANIFOLD – CONTINUED

Figure 3. Intake Manifold Gasket - Details.

NOTE

It may be necessary to tap intake manifold (Figure 3, Item 1) with rubber mallet to loosen manifold from cylinder head (Figure 2, Item 5).

7. Remove intake manifold (Figure 3, Item 1) and gasket (Figure 3, Item 2) from cylinder head (Figure 2, Item 5).
8. Place intake manifold (Figure 3, Item 1) on suitable work surface and discard gasket (Figure 3, Item 2).
9. Cover intake ports on cylinder head (Figure 2, Item 5) to prevent dirt and debris from entering the system.

END OF TASK**Inspect Intake Manifold**

1. Inspect intake manifold (Figure 3, Item 1) for damage and/or cracks.
2. Replace intake manifold (Figure 3, Item 1) if damaged or cracked.

END OF TASK**Install Intake Manifold****CAUTION**

When cleaning around cylinder head ports and intake manifold, use caution that no debris enters the ports. Failure to comply may cause damage to equipment.

1. Remove any dirt or debris from around cylinder head (Figure 2, Item 5) intake ports and mating surface of intake manifold (Figure 3, Item 1).

REMOVE/INSTALL INTAKE MANIFOLD – CONTINUED

2. Uncover intake ports closed earlier for protection.
3. Install new gasket (Figure 3, Item 2) to its mounting location on intake manifold (Figure 3, Item 1).
4. Position intake manifold (Figure 3, Item 1) and gasket (Figure 3, Item 2) to its mounting location on cylinder head (Figure 2, Item 5).
5. Secure intake manifold (Figure 2, Item 2) to cylinder head (Figure 2, Item 5) by installing five new bolts with captive lockwashers (Figure 2, Item 3). Torque bolts to 17-20 ft•lb (24-28 N•m).
6. Install breather hose (Figure 2, Item 4) with clips to its mounting location on valve cover (Figure 2, Item 1) and intake manifold (Figure 2, Item 2).
7. Secure breather hose (Figure 2, Item 4) clips.
8. Install fuel injection lines (WP 0069, Remove/Install Fuel Injector).
9. Install top body panel (WP 0028, Remove/Install Top Body Panel).
10. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
11. Close right-side generator set door.
12. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
13. Start engine and check for proper operation (TM 9-6115-749-10).
14. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCEREMOVE/INSTALL EXHAUST MANIFOLD

INITIAL SETUP:**Test Equipment**

Load Bank (WP 0162, Table 2, Item 2)

Personnel Required

91D (1)

Assistant (1)

Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)

Engine cool

Battery ground cable removed (WP 0036, Remove/Install Batteries)

Top body panel removed (WP 0028, Remove/Install Top Body Panel)

Alternator support bracket removed (WP 0075, Remove/Install Battery-Charging Alternator Assembly)

Materials/Parts

Gasket, exhaust (WP 0107, Item 9)

Gasket, exhaust manifold (WP 0136, Item 2)

Manifold, exhaust (1) (WP 0136, Item 3)

Grease, electrically conductive (WP 0163, Table 1, Item 20)

Rag, wiping (WP 0163, Table 1, Item 31)

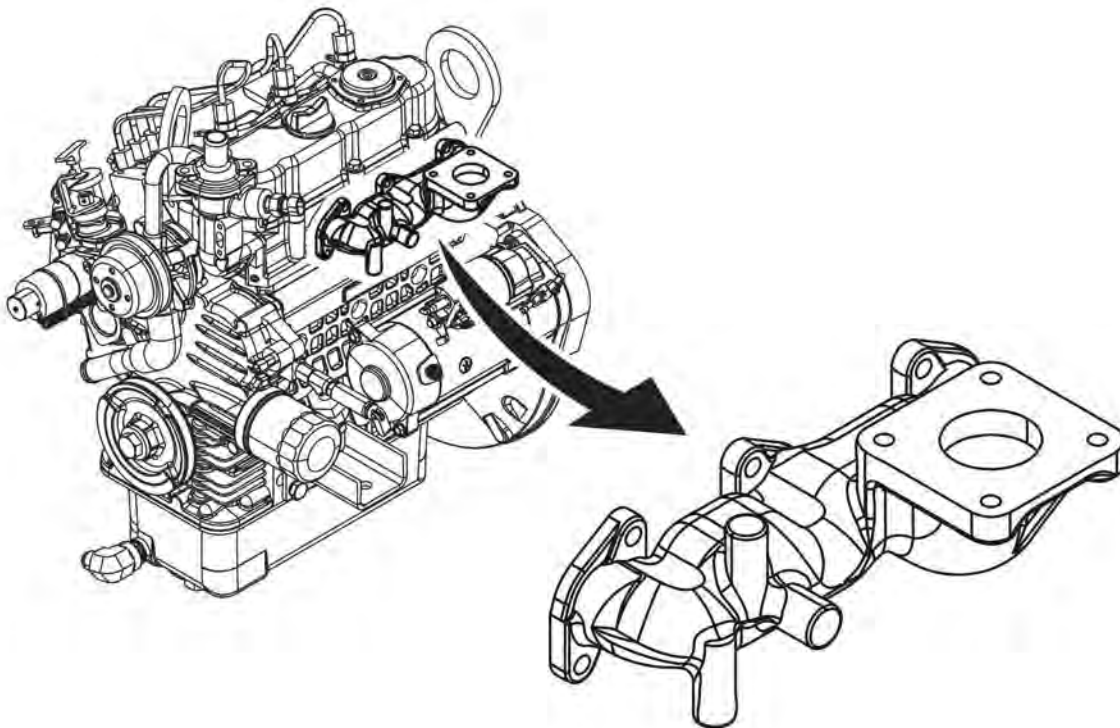
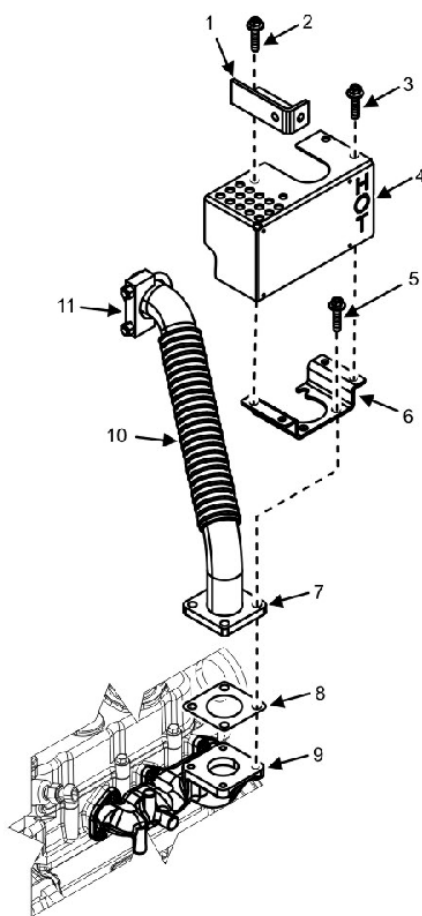
REMOVE/INSTALL EXHAUST MANIFOLD**Remove Exhaust Manifold**

Figure 1. Exhaust Manifold - Location.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Open left-side door on generator set.
3. Locate exhaust manifold (Figure 1).

REMOVE/INSTALL EXHAUST MANIFOLD – CONTINUED

**Figure 2. Heat Shield and Flex Pipe.**

4. Loosen and reposition clamp (Figure 2, Item 11) that secures flex pipe (Figure 2, Item 10) to muffler (not shown).
5. Remove flex pipe (Figure 2, Item 10) from muffler (not shown).
6. Remove two bolts (Figure 2, Item 2) that secure heat shield alternator bracket (Figure 2, Item 1) to heat shield (Figure 2, Item 4).
7. Remove two bolts (Figure 2, Item 3) that secure heat shield (Figure 2, Item 4) to bracket (Figure 2, Item 6).
8. Remove heat shield (Figure 2, Item 4) and place on suitable work surface.
9. Inspect heat shield (Figure 2, Item 4) for signs of obvious damage and replace as required. Otherwise, set heat shield aside (Figure 2, Item 4) for reuse.
10. Remove four screws (Figure 2, Item 5) that secure flex pipe flange (Figure 2, Item 7), gasket (Figure 2, Item 8), and bracket (Figure 2, Item 6) to exhaust manifold (Figure 2, Item 9).
11. Remove flex pipe (Figure 2, Item 10) and gasket (Figure 2, Item 8) from exhaust manifold (Figure 2, Item 9). Discard gasket (Figure 2, Item 8).

REMOVE/INSTALL EXHAUST MANIFOLD – CONTINUED

12. Inspect flex pipe (Figure 2, Item 10), bracket (Figure 2, Item 6), heat shield alternator bracket (Figure 2, Item 1), and clamp (Figure 2, Item 11) for signs of obvious damage and replace as required. Otherwise, set flex pipe (Figure 2, Item 10), bracket (Figure 2, Item 6), heat shield alternator bracket (Figure 2, Item 1), and clamp (Figure 2, Item 11) aside for reuse.

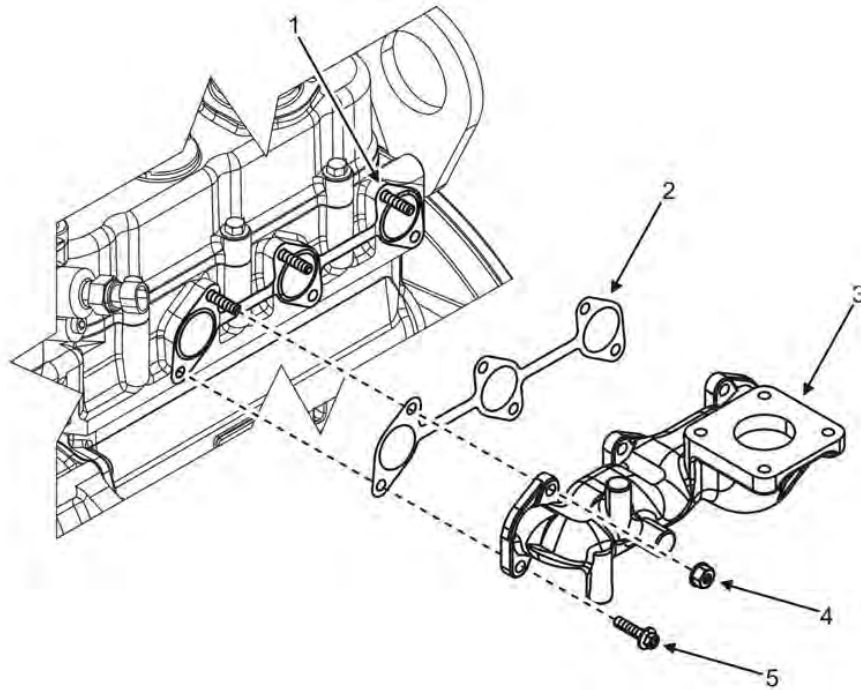


Figure 3. Exhaust Manifold - Removal.

13. Remove three nuts (Figure 3, Item 4) and three screws (Figure 3, Item 5) that secure exhaust manifold (Figure 3, Item 3) to engine (Figure 3, Item 1).
14. Remove exhaust manifold (Figure 3, Item 3) from engine (Figure 3, Item 1) and place on a suitable work surface.
15. Remove and discard exhaust manifold gasket (Figure 3, Item 2) from exhaust manifold (Figure 3, Item 3).
16. Place exhaust manifold (Figure 3, Item 3) on a suitable work surface.
17. Cover open exhaust ports to keep dirt and debris from entering the engine (Figure 3, Item 1).
18. Remove dirt, debris, and residual gasket material from exhaust manifold (Figure 3, Item 3) and engine (Figure 3, Item 1) mounting surfaces.

END OF TASK**Inspect Exhaust Manifold**

1. Inspect exhaust manifold (Figure 3, Item 3) for damage and/or cracks.
2. Replace exhaust manifold (Figure 3, Item 3) if damaged or cracked.

END OF TASK

REMOVE/INSTALL EXHAUST MANIFOLD – CONTINUED**Install Exhaust Manifold**

1. Remove protective cover from exhaust ports.
2. Remove dirt and debris from mounting surfaces of exhaust manifold (Figure 3, Item 3) and engine (Figure 3, Item 1) with wiping rag.
3. Position new gasket (Figure 3, Item 2) to its mounting location on exhaust manifold (Figure 3, Item 3).
4. Position exhaust manifold (Figure 3, Item 3) to its mounting location on engine (Figure 3, Item 1) by installing top of exhaust manifold (Figure 3, Item 3) over studs and aligning bottom mounting holes.
5. Secure exhaust manifold (Figure 3, Item 3) to engine (Figure 3, Item 1) by installing three nuts (Figure 3, Item 4) and three screws (Figure 3, Item 5).
6. Position new gasket (Figure 2, Item 8), flex pipe (Figure 2, Item 10), and bracket (Figure 2, Item 6) to mounting location on exhaust manifold (Figure 2, Item 9) and align mounting holes.
7. Secure flex pipe flange (Figure 2, Item 7) and bracket (Figure 2, Item 6) to exhaust manifold (Figure 2, Item 9) by installing four screws (Figure 2, Item 5).
8. Position heat shield (Figure 2, Item 4) to its mounting location on bracket (Figure 3, Item 6) and align mounting holes.
9. Secure heat shield alternator bracket (Figure 2, Item 1) to heat shield (Figure 2, Item 4) by installing two bolts (Figure 2, Item 2).
10. Secure heat shield (Figure 2, Item 4) to bracket (Figure 2, Item 6) by installing two bolts (Figure 2, Item 3).
11. Install flex pipe (Figure 2, Item 10) to muffler (not shown) and secure by positioning clamp (Figure 2, Item 11).
12. Tighten clamp (Figure 2, Item 11).
13. Install alternator support bracket (WP 0075, Remove/Install Battery-Charging Alternator Assembly).
14. Install top body panel (WP 0028, Remove/Install Top Body Panel).
15. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
16. Close left-side generator set door.
17. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
18. Start engine and check for proper operation (TM 9-6115-749-10).
19. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

REMOVE/INSTALL MUFFLER

INITIAL SETUP:**Test Equipment**

Load Bank (WP 0162, Table 2, Item 2)

Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
 Wrench, Torque, Click, Ratcheting, 3/8 in Drive, 75 ft•lb (WP 0162, Table 2, Item 41)

Materials/Parts

Clamp, loop (WP 0107, Item 4)
 Muffler (WP 0107, Item 5)
 Brush, wire, scratch, brass (WP 0163, Table 1, Item 7)
 Cap set, protective (WP 0163, Table 1, Item 8)
 Cleaning compound, solvent (WP 0163, Table 1, Item 10)

Materials/Parts - cont'd

Grease, electrically conductive (WP 0163, Table 1, Item 20)
 Penetrating oil (WP 0163, Table 1, Item 29)

Personnel Required

91D (1)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool
 Battery ground cable removed (WP 0036, Remove/Install Batteries)
 Top body panel removed (WP 0028, Remove/Install Top Body Panel)

REMOVE/INSTALL MUFFLER**WARNING**

When operating, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow engine to cool before checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.

Remove Muffler

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate muffler (Figure 1).

REMOVE/INSTALL MUFFLER – CONTINUED

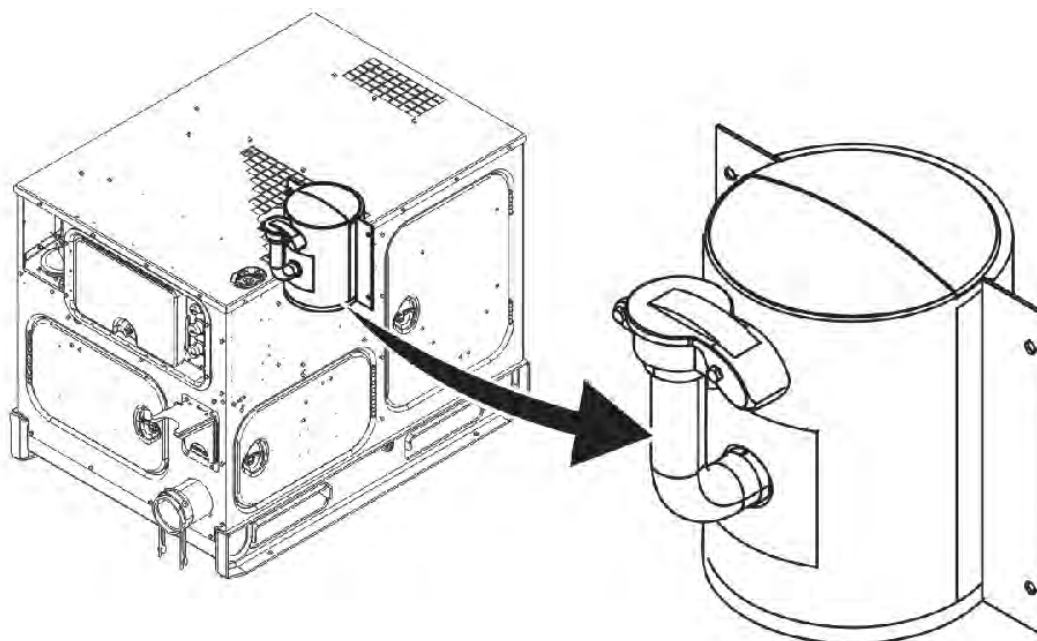


Figure 1. Muffler - Location.

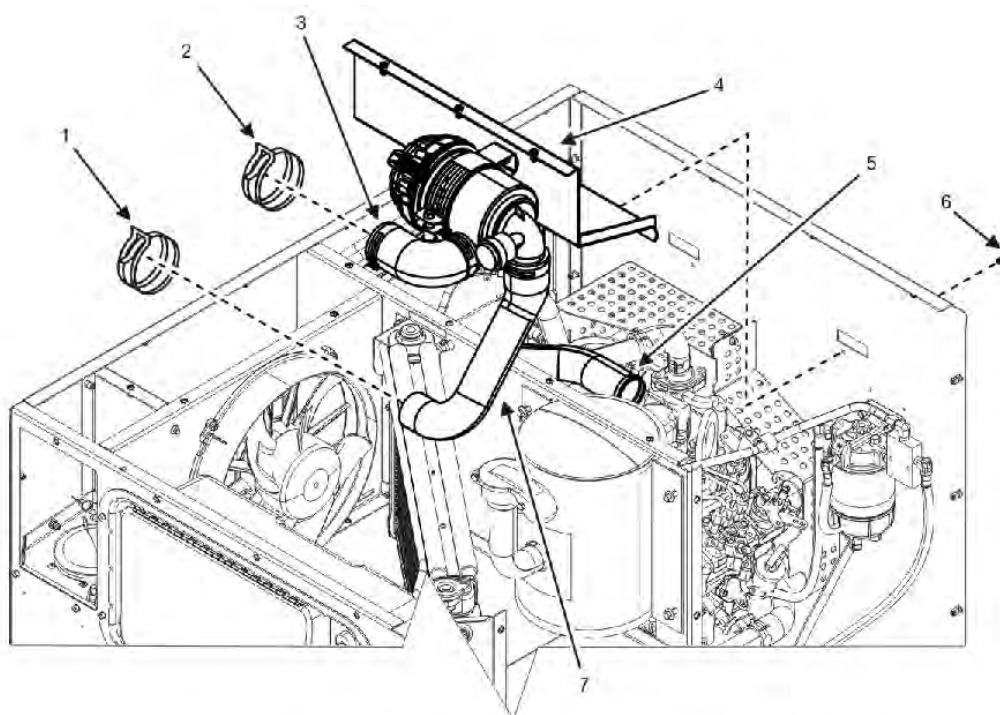


Figure 2. Weather Shield and Air Cleaner.

REMOVE/INSTALL MUFFLER – CONTINUED

3. Reposition hose clip (Figure 2, Item 2) at air cleaner inlet hose (Figure 2, Item 3) and remove inlet hose (Figure 2, Item 3) from inlet air pipe (Figure 2, Item 5).
4. Reposition hose clip (Figure 2, Item 1) at air cleaner outlet hose (Figure 2, Item 7) and remove outlet hose (Figure 2, Item 7) from intake manifold (not shown).
5. Remove two socket head screws (Figure 2, Item 6) that secure weather shield and air cleaner as an assembly (Figure 2, Item 4) to front body panel.
6. Remove weather shield/air cleaner assembly (Figure 2, Item 4) from generator set.
7. Inspect weather shield/air cleaner assembly (Figure 2, Item 4) and attached hoses for signs of obvious damage.
8. Replace damaged components as required. Otherwise, set weather shield/air cleaner assembly (Figure 2, Item 4) aside for reuse.

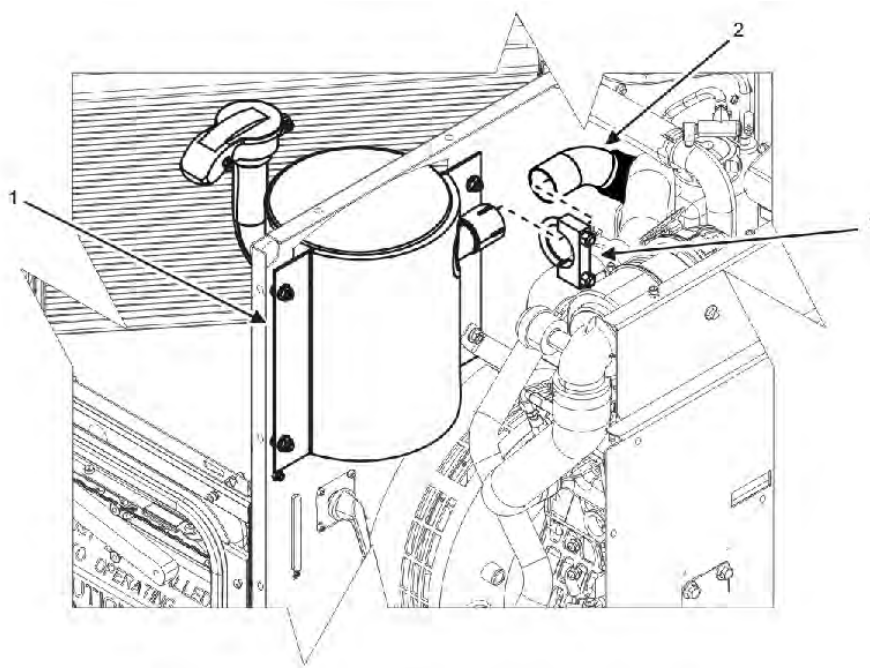
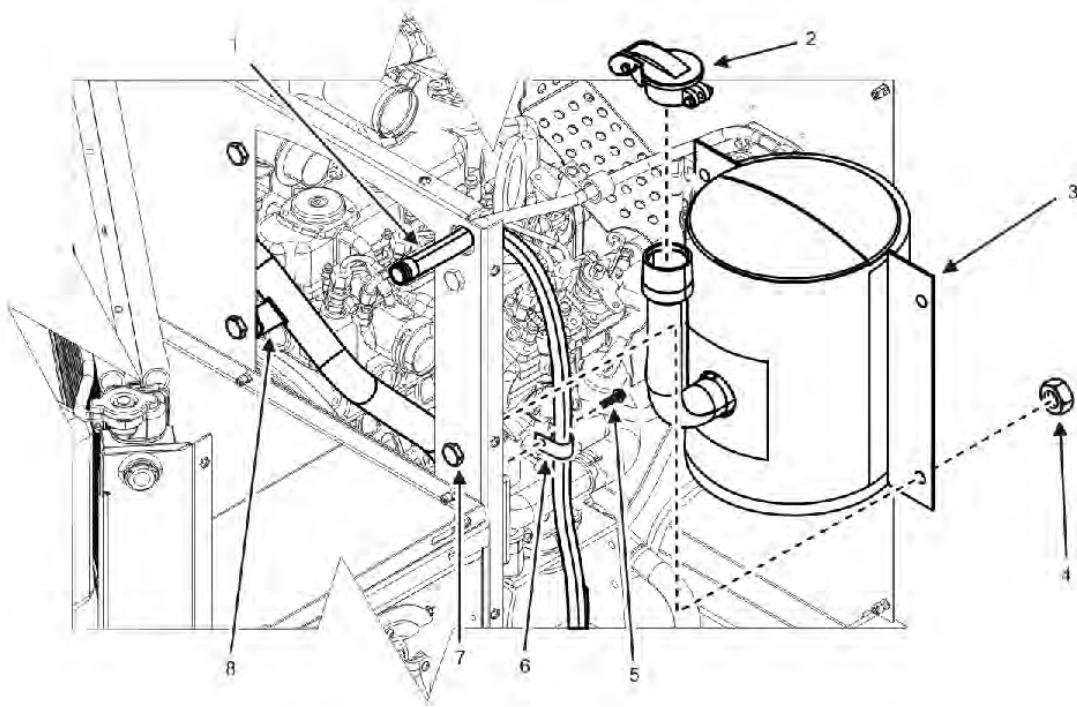


Figure 3. Clamp and Bracket.

9. Apply penetrating oil to nuts on clamp (Figure 3, Item 3) and the joint between muffler (Figure 3, Item 1) and flex pipe (Figure 3, Item 2). Allow penetrating oil to soak for 5 min.
10. Apply index marks to muffler (Figure 3, Item 1) and flex pipe (Figure 3, Item 2) to aid at installation.
11. Loosen and reposition clamp (Figure 3, Item 3) to allow separation between flex pipe (Figure 3, Item 2) and muffler (Figure 3, Item 1).
12. Remove flex pipe (Figure 3, Item 2) from muffler (Figure 3, Item 1).
13. Cap/plug open end of flex pipe (Figure 3, Item 2) to prevent dirt and debris from entering engine.
14. Remove bolt (Figure 4, Item 5) securing clamp (Figure 4, Item 6) to generator set and reposition winterization kit exhaust tube (if equipped) (Figure 4, Item 1) to gain access to muffler mounting nuts (Figure 4, Item 4).
15. Inspect winterization kit exhaust tube (Figure 4, Item 1) for signs of obvious damage.

REMOVE/INSTALL MUFFLER – CONTINUED**Figure 4. Muffler - Removal.**

16. Replace damaged winterization kit exhaust tube (Figure 4, Item 1). Otherwise, set winterization kit exhaust tube (Figure 4, Item 1) aside for reuse.
17. Remove four muffler mounting nuts (Figure 4, Item 4) that secure muffler (Figure 4, Item 3) to interior panel.
18. Pry lower radiator pipe bracket (Figure 4, Item 8) from lower left muffler mounting screw.
19. Remove muffler (Figure 4, Item 3) from four mounting screws (Figure 4, Item 7) and place on a suitable work surface.
20. Loosen screw on rain cap (Figure 4, Item 2) and remove rain cap (Figure 4, Item 2) from muffler (Figure 4, Item 3).
21. Inspect rain cap (Figure 4, Item 2) for signs of obvious damage.
22. Replace damaged rain cap (Figure 4, Item 2). Otherwise set rain cap (Figure 4, Item 2) aside for reuse.

END OF TASK**Clean and Inspect Muffler****WARNING**

Compound cleaning solvent is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection is required. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply may cause injury or death to personnel.

1. Clean muffler (Figure 4, Item 3) and flex pipe (Figure 3, Item 2) mating surfaces with stiff bristle brush and compound cleaning solvent.
2. Inspect muffler (Figure 4, Item 3) for dents, cracks, excessive corrosion, clogging, and other damage.

REMOVE/INSTALL MUFFLER – CONTINUED

3. Replace damaged muffler (Figure 4, Item 3). Otherwise, set muffler (Figure 4, Item 3) aside for reuse.
4. Discard and replace clamp (Figure 3, Item 3) if damaged or corroded. Otherwise set clamp (Figure 3, Item 3) aside for reuse.
5. Transfer indexing marks from components to be replaced to new components.

END OF TASK**Install Muffler**

1. Install rain cap (Figure 4, Item 2) to muffler (Figure 4, Item 3) and tighten mounting screw.
2. Position muffler (Figure 4, Item 3) to its mounting location on interior panel at four mounting screws (Figure 4, Item 7).
3. Position lower radiator pipe bracket (Figure 4, Item 8) to its mounting position on lower left muffler mounting screw.
4. Install four muffler mounting nuts (Figure 4, Item 4) finger-tight.
5. Remove protective plug from flex pipe (Figure 3, Item 2).
6. Assemble muffler (Figure 3, Item 1) and flex pipe (Figure 3, Item 2) using indexing marks applied at removal.
7. Install clamp (Figure 3, Item 3) to secure flex pipe (Figure 3, Item 2) to muffler (Figure 3, Item 1).
8. Torque four muffler mounting nuts (Figure 4, Item 4) at bulkhead to 17-21 ft•lb (23-29 N•m).
9. Position winterization kit exhaust tube (if equipped) (Figure 4, Item 1) to generator set, and secure clamp (Figure 4, Item 6) to generator set with bolt (Figure 4, Item 5).
10. Position weather shield/air cleaner assembly (Figure 2, Item 4) to mounting location on front body panel and align the mounting holes.
11. Secure weather shield/air cleaner assembly (Figure 2, Item 4) to front body panel by installing two socket-head screws (Figure 2, Item 6).
12. Install air cleaner outlet hose (Figure 2, Item 7) to intake manifold (not shown) and secure by installing hose clip (Figure 2, Item 1).
13. Install air cleaner inlet hose (Figure 2, Item 3) to inlet air pipe (Figure 2, Item 5) and secure by installing hose clip (Figure 2, Item 2).
14. Install top body panel (WP 0028, Remove/Install Top Body Panel).
15. Install ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
16. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
17. Start engine and check for proper operation (TM 9-6115-749-10). Bring coolant to normal operating temperature and then apply a 100% rated load for 30 min (TM 9-6115-749-10).
18. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

REMOVE/INSTALL VALVE COVER

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
Wrench, Torque, Click, Ratcheting, 3/8 in Drive, 75 ft•lb (WP 0162, Table 2, Item 41)

Materials/Parts

Assembly, valve cover (WP 0141, Item 6)
Gasket, valve cover (1) (WP 0141, Item 11)
O-ring (1) (WP 0141, Item 1)
Cap set, protective (WP 0163, Table 1, Item 8)
Cleaning compound, solvent (WP 0163, Table 1, Item 10)
Grease, electrically conductive (WP 0163, Table 1, Item 20)
Rag, wiping (WP 0163, Table 1, Item 31)

Personnel Required

91D (1)
Assistant (1)

References

WP 0064, Remove/Install 50/60 Hz Engine Assembly
WP 0065, Remove/Install 400 Hz Engine Assembly

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)
Top body panel removed (WP 0028, Remove/Install Top Body Panel)

REMOVE/INSTALL VALVE COVER

Remove Valve Cover

1. Ensure equipment conditions are met in order presented in initial setup.
2. Open right-side door and locate valve cover (Figure 1).

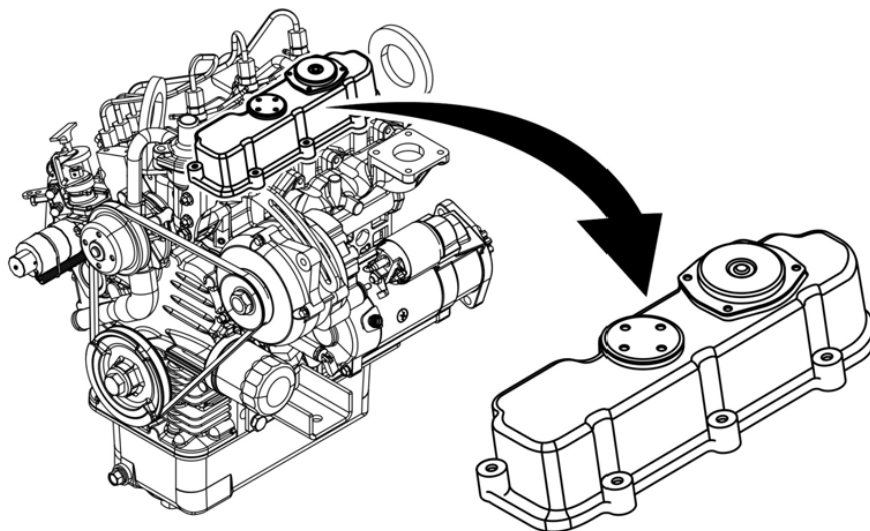
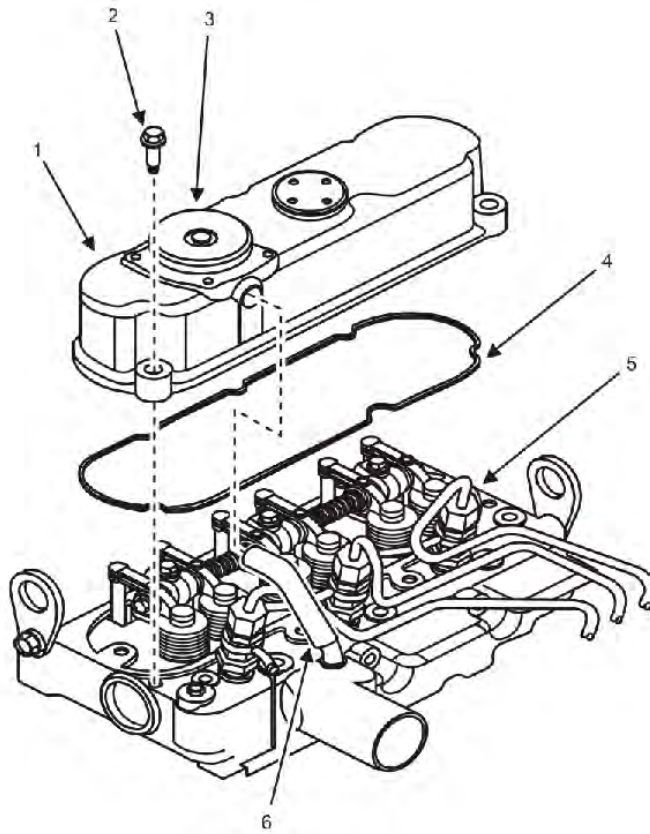


Figure 1. Valve Cover and Gasket - Location.

REMOVE/INSTALL VALVE COVER – CONTINUED**Figure 2. Valve Cover and Gasket - Detail.**

3. Release clip securing breather hose (Figure 2, Item 6) to breather assembly (Figure 2, Item 3).
4. Remove breather hose (Figure 2, Item 6) from breather assembly (Figure 2, Item 3).
5. Cap/plug breather hose (Figure 2, Item 6) to prevent dirt or debris from entering the intake manifold.
6. Inspect breather hose (Figure 2, Item 6) for damage or corrosion and replace as required.
7. Remove four bolts (Figure 2, Item 2) securing valve cover (Figure 2, Item 1) to cylinder head (Figure 2, Item 5).
8. Inspect hardware for damage or corrosion and replace as required.
9. Remove valve cover (Figure 2, Item 1) from cylinder head (Figure 2, Item 5).
10. Cover cylinder head (Figure 2, Item 5) to prevent dirt or debris from entering engine.

END OF TASK**Inspect Valve Cover**

1. Inspect valve cover (Figure 2, Item 1) to determine if valve cover gasket (Figure 2, Item 4) was removed with valve cover.

CAUTION

Dislodged gasket material can clog oil passages and lead to engine damage. If removal of gasket material from head assembly is required, be sure to prevent gasket debris from entering the head assembly. Failure to comply may cause damage to equipment.

REMOVE/INSTALL VALVE COVER – CONTINUED**NOTE**

Valve cover gasket is embedded in groove on bottom of valve cover. Gasket may stick to top of cylinder head when valve cover is removed.

2. Remove and discard gasket (Figure 2, Item 4) and any residual gasket material from valve cover (Figure 2, Item 1) and cylinder head (Figure 2, Item 5) if present.

WARNING

Compound cleaning solvent is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection is required. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply may cause injury or death to personnel.

3. Clean valve cover (Figure 2, Item 1) with compound cleaning solvent and rags to remove any dirt, debris, or excess oil.
4. Inspect valve cover (Figure 2, Item 1) for obvious signs of damage or corrosion and discard if damaged.
5. Clean gasket mounting surfaces on valve cover (Figure 2, Item 1) and cylinder head (Figure 2, Item 5) using compound cleaning solvent and a wiping rag prior to installation.
6. Inspect cylinder head (Figure 2, Item 5) for signs of obvious damage.
7. Replace engine if cylinder head is damaged (WP 0064, Remove/Install 50/60 Hz Engine Assembly or WP 0065, Remove/Install 400 Hz Engine Assembly).
8. Dispose of soiled rags IAW local SOP.

END OF TASK**Install Valve Cover**

1. Position new gasket (Figure 2, Item 4) in groove on valve cover (Figure 2, Item 1).
2. Place valve cover (Figure 2, Item 1) on mounting location on top of cylinder head (Figure 2, Item 5).
3. Secure valve cover (Figure 2, Item 1) and gasket (Figure 2, Item 4) to cylinder head (Figure 2, Item 5) using four bolts (Figure 2, Item 2). Finger-tighten.
4. Using a crossing pattern, tighten all valve cover mounting bolts (Figure 2, Item 2). Torque bolts to 5-8 ft•lb (7-11 N•m).
5. Install breather hose (Figure 2, Item 6) on breather assembly (Figure 2, Item 3).
6. Install clip securing breather hose (Figure 2, Item 6) to breather assembly (Figure 2, Item 3).
7. Install top body panel (WP 0028, Remove/Install Top Body Panel).
8. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
9. Close right-side generator set door.
10. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
11. Start engine and check for proper operation (TM 9-6115-749-10).
12. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
CHECK/ADJUST ENGINE VALVES

INITIAL SETUP:**Test Equipment**

Load Bank (WP 0162, Table 2, Item 2)

Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Materials/Parts

Gasket, valve cover (1) (WP 0141, Item 11)
Grease, electrically conductive (WP 0163, Table 1, Item 20)
Rag, wiping (WP 0163, Table 1, Item 31)

Personnel Required

91D (1)

References

WP 0064, Remove/Install 50/60 Hz Engine Assembly
WP 0065, Remove/Install 400 Hz Engine Assembly

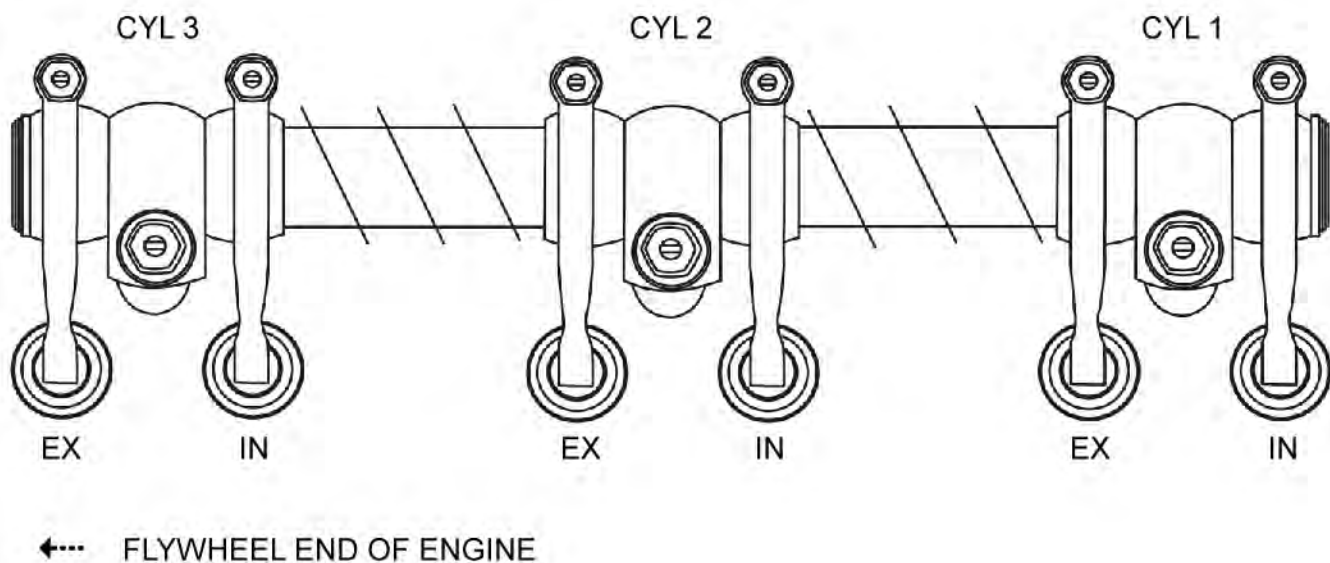
Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)
Top body panel removed (WP 0028, Remove/Install Top Body Panel)
Valve cover removed (WP 0082, Remove/Install Valve Cover)
Glow plugs removed (WP 0068, Remove/Install Valve Cover)

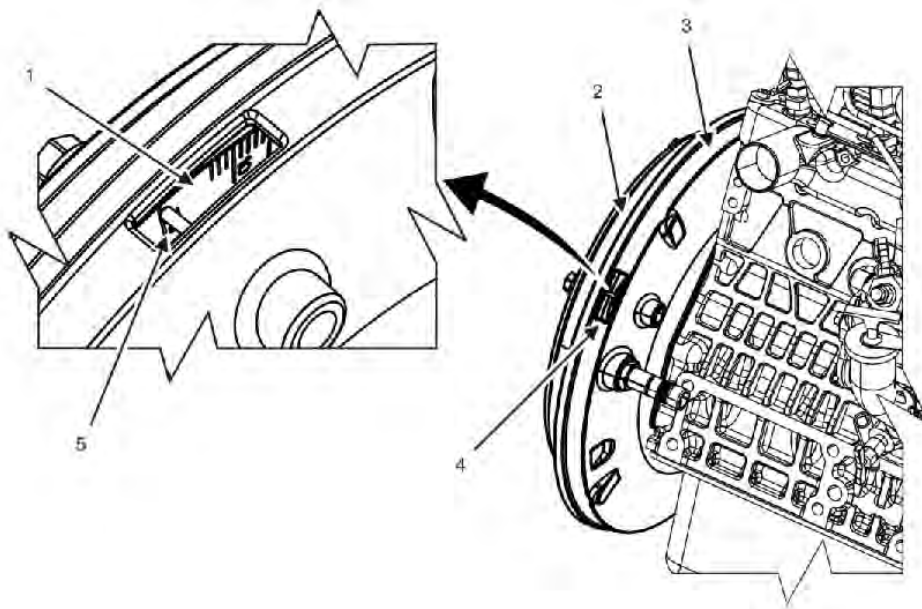
CHECK/ADJUST ENGINE VALVES**Check/Adjust Valves****NOTE**

As shown in Figure 1, the sequence of cylinder (Cyl) numbers is one, two, and three starting from gear case side of engine, or in reverse sequence (three, two, and one) when starting from flywheel side of engine. Each cylinder contains one intake (IN) valve and one exhaust (EX) valve.

CHECK/ADJUST ENGINE VALVES – CONTINUED

**Figure 1. Intake and Exhaust Valve - Locations.**

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate intake and exhaust valves (Figure 1).

**Figure 2. Flywheel Alignment Markings.**

CHECK/ADJUST ENGINE VALVES – CONTINUED**CAUTION**

Valve clearance must be checked and adjusted when engine is cool. Adjusting valves when engine is hot may result in inaccurate settings, causing poor performance and/or engine damage. Valve clearance for intake and exhaust valves must be set to 0.00571-0.00728 in (0.145-0.185 mm). Failure to comply may cause damage to equipment.

NOTE

Timing marks (Figure 2, Item 1) are located on flywheel (Figure 2, Item 2) and are visible through a cutout (Figure 2, Item 4) in flywheel housing (Figure 2, Item 3).

When piston number one is at TDC on the compression stroke, both rocker arms for cylinder number one can be moved. TDC on the overlap stroke permits movement of only one rocker arm for cylinder number one.

3. Rotate crankshaft at water pump end of engine until 1|TC mark on flywheel and pointer (Figure 2, Item 5) on flywheel housing (Figure 2, Item 3) are aligned.
4. Confirm TDC on compression stroke has been established in cylinder number one by moving rocker arms of cylinder number one intake and exhaust valves up and down.
 - a. Rotate crankshaft an additional 360° and re-check for rocker arm movement if both cylinder number one rocker arms cannot be moved. Continue rotation until TDC is achieved.
 - b. Perform valve clearance checks as indicated in Table 1 when both cylinder number one rocker arms can be moved.

CHECK/ADJUST ENGINE VALVES – CONTINUED

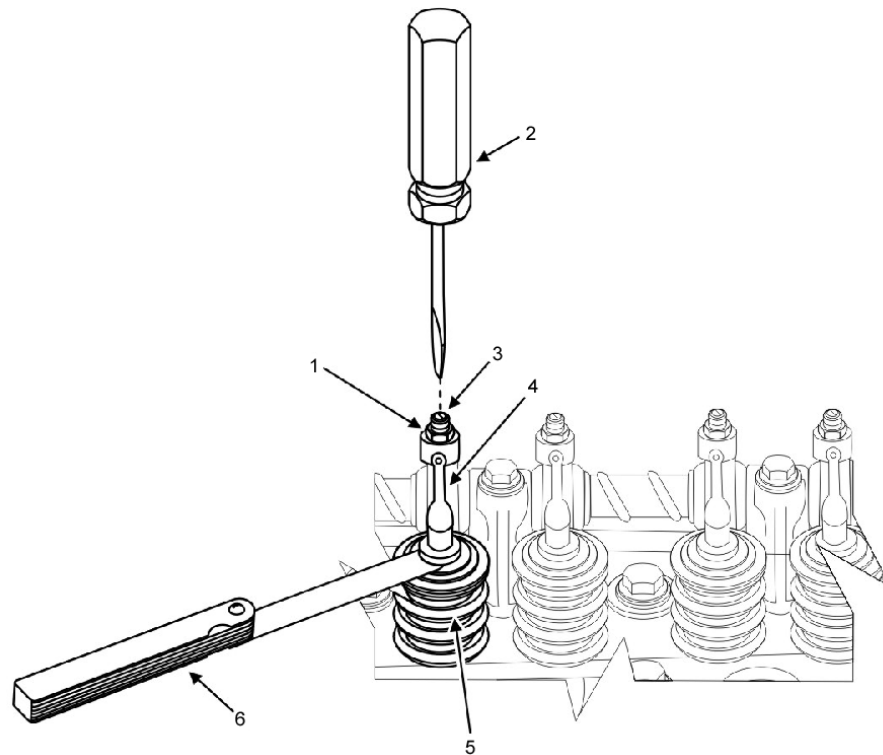


Figure 3. Check/Adjust Valve Clearance.

CAUTION

If any valve cannot be adjusted to specified tolerances, inspect rocker arms and push rods for damage or wear. Replace the engine assembly if there is damage to the rocker arms and/or push rods (WP 0064, Remove/Install 50/60 Hz Engine Assembly or WP 0065, Remove/Install 400 Hz Engine Assembly). Do not run engine with valve(s) that cannot be adjusted to specifications. Failure to comply will cause damage to equipment.

Table 1. Adjust Engine Valves on Compression Stroke.

	Cylinder	Intake Valve	Exhaust Valve
Piston number one at TDC on compression stroke	1	Adjust	Adjust
	2	-	Adjust
	3	Adjust	-

5. Check valve clearance on cylinder number one intake valve by inserting thickness gauge (Figure 3, Item 6) of 0.00571-0.00728 in (0.145-0.185 mm) between rocker arm (Figure 3, Item 4) and valve stem (Figure 3, Item 5).

CHECK/ADJUST ENGINE VALVES – CONTINUED**NOTE**

If thickness gauge (Figure 3, Item 6) is too large to fit between rocker arm (Figure 3, Item 4) and valve stem (Figure 3, Item 5) or if gauge can be inserted and withdrawn without drag, valve clearance requires adjustment.

6. Insert thickness gauge (Figure 3, Item 6) between rocker arm (Figure 3, Item 4) and valve stem (Figure 3, Item 5) and verify that gauge can be inserted and removed with only slight drag.
7. Adjust valve clearance as follows:
 - a. Turn valve stem locknut (Figure 3, Item 1) on rocker arm (Figure 3, Item 4) counterclockwise to open.
 - b. Turn valve adjustment screw (Figure 3, Item 3) clockwise using screwdriver (Figure 3, Item 2) to tighten valve clearance or counterclockwise to loosen valve clearance.
 - c. Turn valve adjustment screw (Figure 3, Item 3) until slight drag is detected on thickness gauge (Figure 3, Item 6) as it is inserted and withdrawn between rocker arm (Figure 3, Item 4) and valve stem (Figure 3, Item 5).
8. Secure valve stem locknut (Figure 3, Item 1) by turning it clockwise after correct valve adjustment has been established.
9. Verify valve clearance after tightening valve stem locknut (Figure 3, Item 1) to ensure it is within specification in Step 5 above.
10. Repeat Steps 5 through 9 to check/adjust valve clearance on exhaust valve of cylinder number one, exhaust valve on cylinder number two, and intake valve on cylinder number three without moving crankshaft.
11. Rotate crankshaft 360° at gear case end until 1|TC mark (Figure 2, Item 2) on flywheel and hash mark (Figure 2, Item 1) on rear end plate are aligned.
12. Repeat Steps 6 through 9 to check/adjust valve clearance on intake valve of cylinder number two and exhaust valve on cylinder number three as shown in Table 2.

Table 2. Adjust Engine Valves at Overlap Position.

	Cylinder	Intake Valve	Exhaust Valve
Piston number one at TDC in overlap position (360° past compression stroke TDC)	1	-	-
	2	Adjust	-
	3	-	Adjust

13. Install glow plugs (WP 0068, Remove/Install Glow Plugs).
14. Install valve cover and new valve cover gasket (WP 0082, Remove/Install Valve Cover-->).
15. Install top panel (WP 0028, Remove/Install Top Body Panel).
16. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
17. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
18. Start engine and check for proper operation (TM 9-6115-749-10). Bring coolant to normal operating temperature and then apply a 100% rated load for 30 min (TM 9-6115-749-10).
19. Repair as required.
20. Dispose of soiled rags IAW local SOP.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE

REMOVE/INSTALL OIL PAN AND STRAINER

INITIAL SETUP:

Tools and Special Tools

Hammer, Hand, Soft Face, Dead Blow (WP 0162, Table 2, Item 15)
 Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Materials/Parts - cont'd

Rag, wiping (WP 0163, Table 1, Item 31)

Personnel Required

91D (1)

Materials/Parts

Bolt (1) (WP 0137, Item 1)
 Bolt (22) (WP 0137, Item 2)
 O-ring (WP 0137, Item 5)
 Pan, oil (WP 0137, Item 3)
 Strainer (WP 0137, Item 4)
 Compound, sealing (WP 0163, Table 1, Item 15)
 Lubricating oil, engine (WP 0163, Table 1, Item 23)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool
 Battery ground cable removed (WP 0036, Remove/Install Batteries)
 Engine removed from generator set (WP 0064, Remove/Install 50/60 Hz Engine Assembly or WP 0065, Remove/Install 400 Hz Engine Assembly)

REMOVE/INSTALL OIL PAN AND OIL STRAINER

Remove Oil Pan and Strainer

1. Ensure equipment conditions are met in order presented in initial setup.
2. Rotate engine 180° on stand to bring oil pan (Figure 1) to top for easier access.

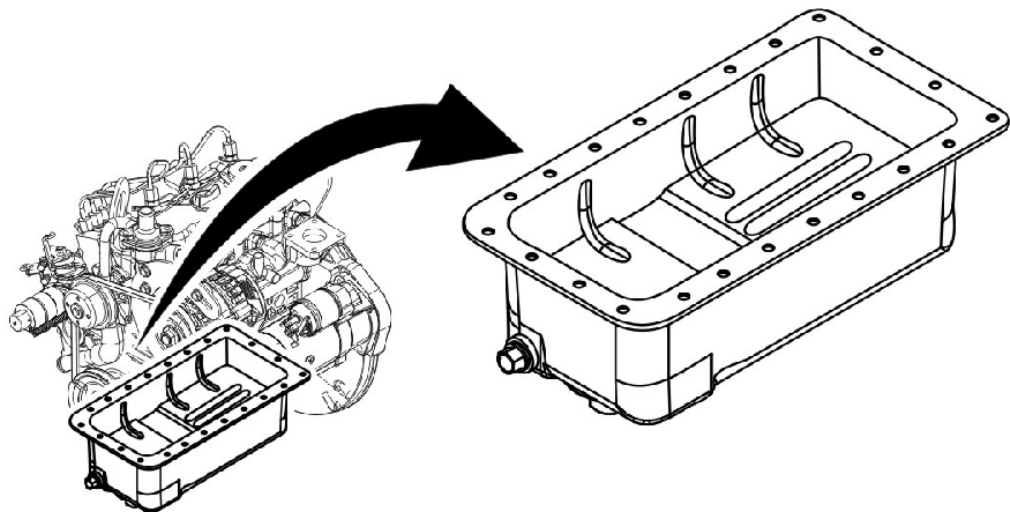
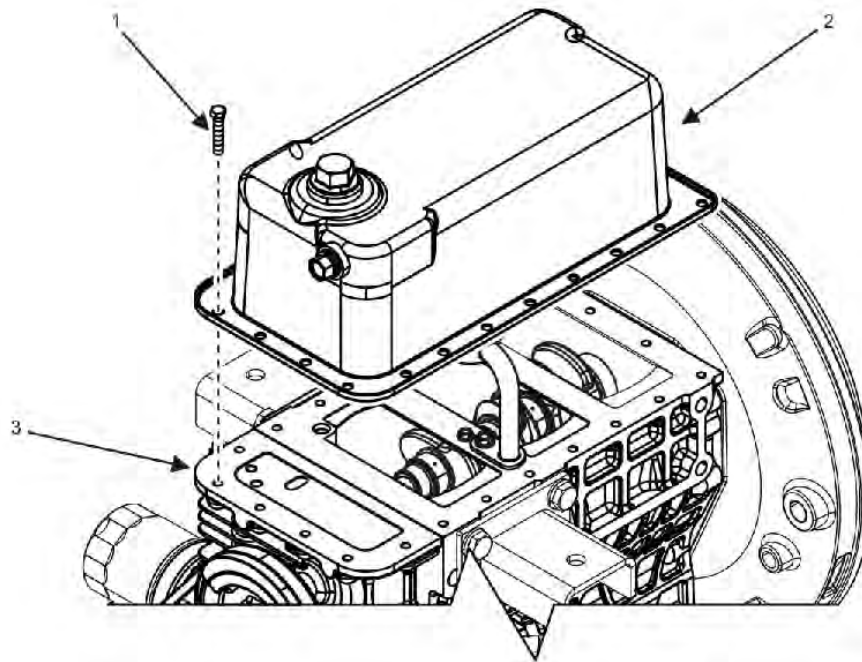
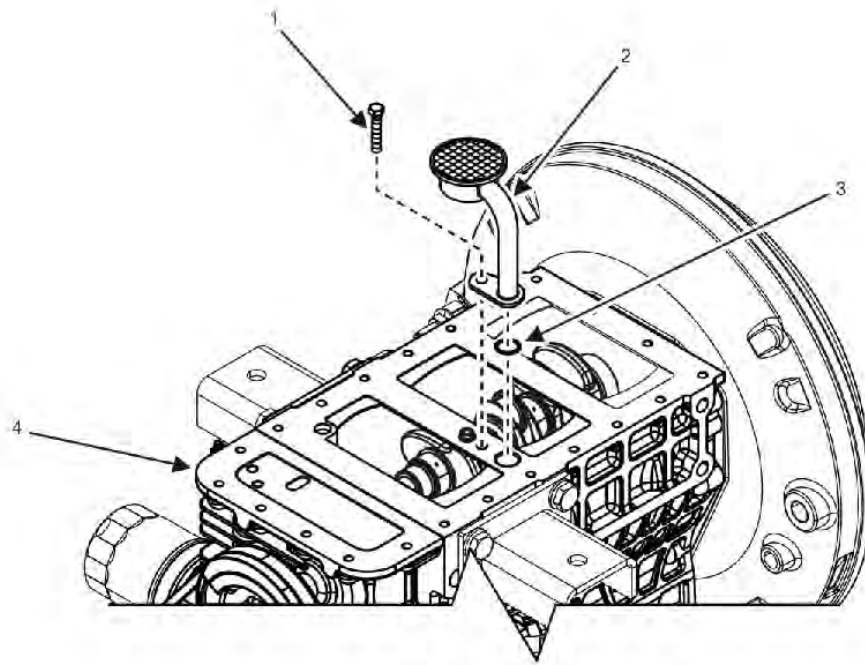


Figure 1. Oil Pan - Location.

REMOVE/INSTALL OIL PAN AND OIL STRAINER – CONTINUED

**Figure 2. Oil Pan - Removal.**

3. Remove and discard 22 screws with captive lockwashers (Figure 2, Item 1) securing oil pan (Figure 2, Item 2) to engine block (Figure 2, Item 3).
4. Remove oil pan (Figure 2, Item 2) from engine block (Figure 2, Item 3) by lightly tapping oil pan (Figure 2, Item 2) with rubber mallet.

REMOVE/INSTALL OIL PAN AND OIL STRAINER – CONTINUED**Figure 3. Oil Strainer - Removal.****CAUTION**

There are two possible mounting holes in the oil strainer mounting plate. Prior to removing the oil strainer mounting screw, mark the mounting hole used for mounting the strainer to the engine block. This will aid during installation. Failure to comply may cause damage to equipment.

5. Remove and discard screw with captive lockwasher (Figure 3, Item 1) securing oil strainer suction tube (Figure 3, Item 2) to engine block (Figure 3, Item 4).
6. Remove oil strainer suction tube (Figure 3, Item 2) from engine block (Figure 3, Item 4).
7. Remove and discard O-ring (Figure 3, Item 3) from oil strainer suction tube (Figure 3, Item 2).

END OF TASK**Inspect Oil Pan and Strainer****CAUTION**

When removing gasket material from engine block, use caution to keep gasket residue and other foreign material from entering the engine block. Failure to comply may cause damage to equipment.

1. Remove all gasket material from mating surfaces of oil pan (Figure 2, Item 2) and engine block (Figure 2, Item 3).
2. Remove residual oil from oil pan (Figure 2, Item 2) with wiping rag prior to installation.
3. Inspect oil pan (Figure 2, Item 2) for cracks, dents, and other damage.
4. Repair small dents in oil pan (Figure 2, Item 2) by tapping dents back into place with rubber mallet.

REMOVE/INSTALL OIL PAN AND OIL STRAINER – CONTINUED

5. Replace oil pan (Figure 2, Item 2) if large dents or cracks that may affect capacity or oil flow are present.
6. Inspect oil strainer suction tube (Figure 3, Item 2) for cracked or bent tube or broken screen.
7. Replace oil strainer suction tube (Figure 3, Item 2) if tube is cracked or bent or if screen is broken.
8. Remove dirt and debris from oil strainer suction tube (Figure 3, Item 2) prior to installation.

END OF TASK**Install Oil Pan and Strainer**

1. Apply a thin coat of clean engine oil to new oil strainer O-ring (Figure 3, Item 3).
2. Install new O-ring (Figure 3, Item 3) to oil strainer suction tube (Figure 3, Item 2).

CAUTION

There are two possible mounting holes in oil strainer mounting plate. Use mounting hole marked prior to removal to ensure the correct mounting hole is utilized at installation. Position the oil strainer as shown in Figure 3. The correct mounting hole will be the one closest to gear case end of the engine. Failure to comply may cause damage to equipment.

3. Position oil strainer suction tube (Figure 3, Item 2) to mounting location on engine block (Figure 3, Item 4) from which tube was removed.
4. Secure oil strainer suction tube (Figure 3, Item 2) to engine block (Figure 3, Item 4) by installing new bolt with captive lockwasher (Figure 3, Item 1).

NOTE

Wait approximately 20 min after gasket sealant has been applied to install oil pan to engine block.

5. Apply a 0.20 in (5 mm) bead of sealing compound (liquid gasket) (Figure 4, Item 1) to flange of oil pan (Figure 4, Item 2).
6. Position oil pan (Figure 2, Item 2) to its mounting location on engine block (Figure 2, Item 3).
7. Install oil pan (Figure 2, Item 2) to engine block by installing 22 new mounting screws with captive lockwashers (Figure 2, Item 1) finger-tight.
8. Secure oil pan mounting screws with captive lockwashers (Figure 2, Item 1) in a diagonal pattern to avoid uneven tightening of oil pan.

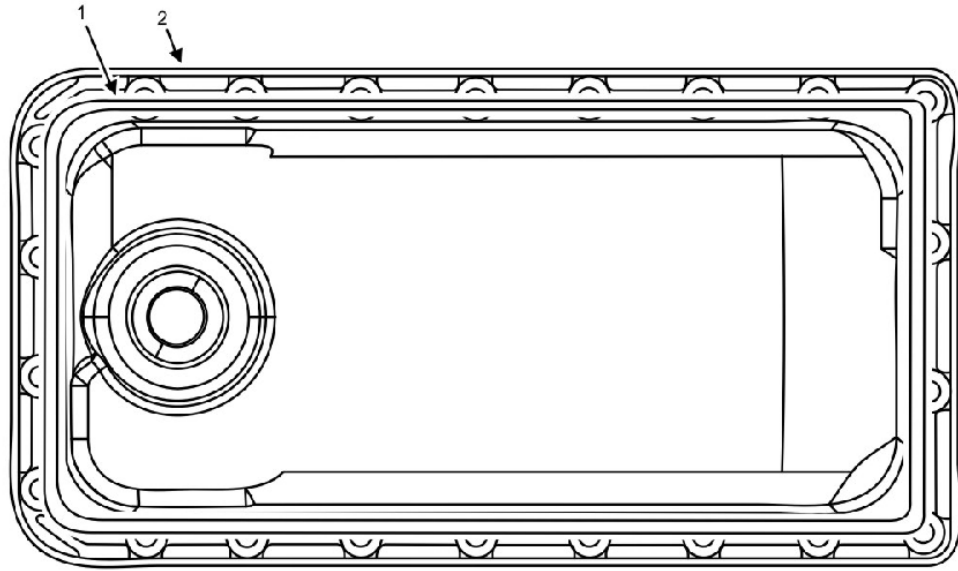
REMOVE/INSTALL OIL PAN AND OIL STRAINER – CONTINUED

Figure 4. Sealing Compound (Liquid Gasket) Application.

NOTE

Wait approximately 30 min before adding engine oil to oil pan.

9. Install engine into generator set (WP 0064, Remove/Install 50/60 Hz Engine Assembly or WP 0065, Remove/Install 400 Hz Engine Assembly).
10. Install ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
11. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
12. Start engine and check for proper operation (TM 9-6115-749-10).
13. Repair as required.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE
REMOVE/INSTALL FLYWHEEL

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
Wrench, Torque, Click, Ratcheting, 3/8 in Drive, 75 ft•lb (WP 0162, Table 2, Item 41)

Personnel Required

91D (1)
Assistant (1)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Engine cool
Battery ground cable removed (WP 0036, Remove/Install Batteries)
AC generator removed (WP 0049, Remove/Install 50/60 Hz AC Generator Assembly or WP 0050, Remove/Install 400 Hz AC Generator Assembly)

Materials/Parts

Flywheel (WP 0138, Item 3)
Screws, hex head (M10 x 1.25 x 20) (5) (WP 0138, Item 4)
Alcohol, denatured (WP 0163, Table 1, Item 1)
Grease, electrically conductive (WP 0163, Table 1, Item 20)
Rag, wiping (WP 0163, Table 1, Item 31)

REMOVE/INSTALL FLYWHEEL**WARNING**

The flywheel is heavy and must be securely supported during removal. Failure to comply may cause injury or death to personnel.

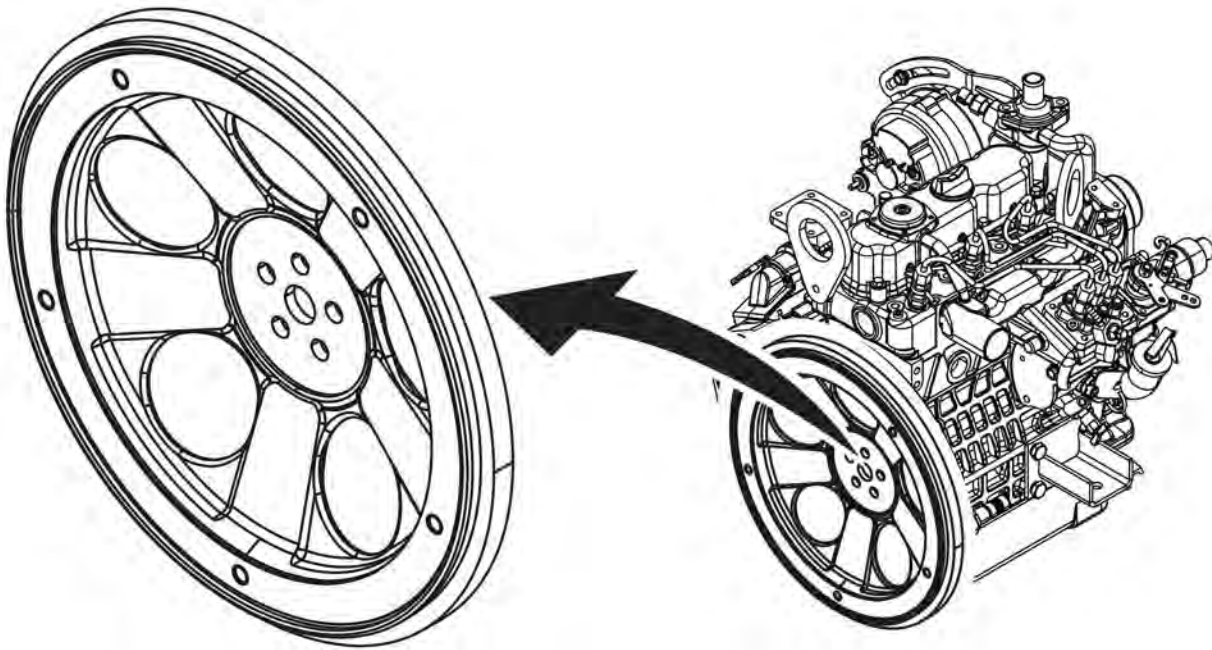
REMOVE/INSTALL FLYWHEEL – CONTINUED**Remove Flywheel**

Figure 1. Flywheel - Location.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate flywheel (Figure 1).

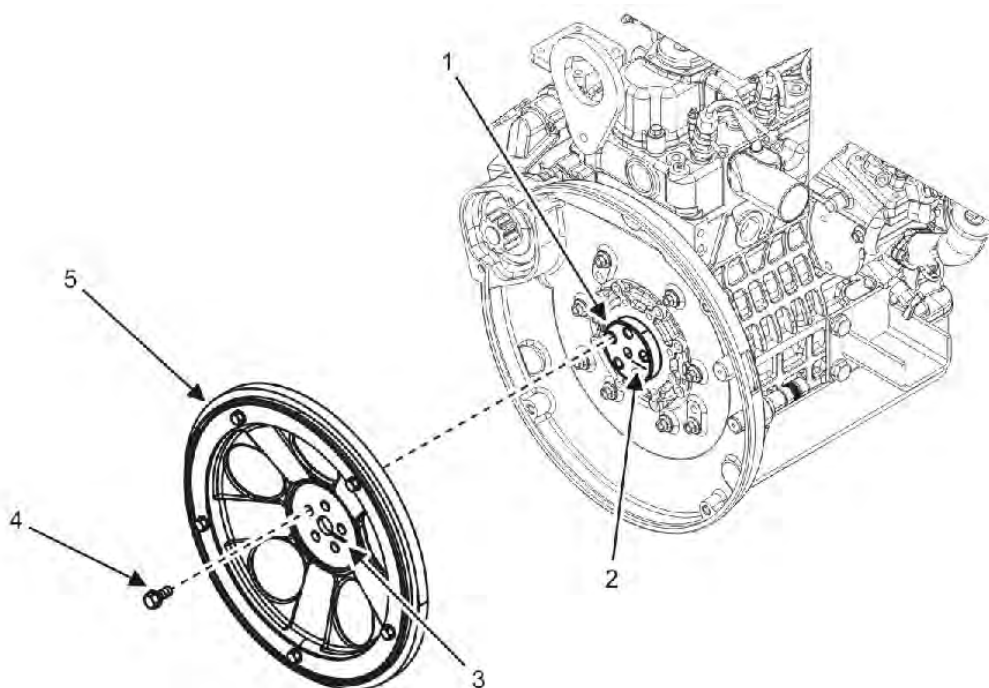
REMOVE/INSTALL FLYWHEEL – CONTINUED

Figure 2. Remove Flywheel.

CAUTION

The position of the flywheel with respect to the crankshaft flange must be marked prior to removing the flywheel so the flywheel can be re-installed properly. Failure to comply may cause damage to equipment.

NOTE

TDC is sometimes marked as TC on flywheels.

3. Rotate crankshaft (crankshaft flange shown in Figure 2, Item 1) to ensure TDC marking on flywheel (Figure 2, Item 5) is aligned with pin visible through port in flywheel housing.
4. Place reference marks (Figure 2, Items 2 and 3) on flywheel (Figure 2, Item 5) noting flywheel position with respect to crankshaft flange (Figure 2, Item 1).
5. Secure flywheel (Figure 2, Item 5) from moving during removal.
6. Remove five screws (Figure 2, Item 4) securing flywheel (Figure 2, Item 5) to crankshaft flange (Figure 2, Item 1). Discard screws (Figure 2, Item 4).
7. Remove flywheel (Figure 2, Item 5) from engine and place on a suitable work surface.

END OF TASK**Inspect Flywheel**

1. Inspect flywheel (Figure 2, Item 5) for obvious signs of damage or corrosion and replace if damaged or corroded.

REMOVE/INSTALL FLYWHEEL – CONTINUED**NOTE**

Dispose of soiled rags IAW local SOP.

2. Prior to installation, clean flywheel (Figure 2, Item 5) using denatured alcohol and wiping rag. Being careful not to erase indexing mark (Figure 2, Item 3) applied at removal.

END OF TASK**Install Flywheel**

1. Remove any oil, dirt, or debris on mating surfaces of crankshaft flange (Figure 2, Item 1) to flywheel using denatured alcohol and a wiping rag prior to installing flywheel (Figure 2, Item 5).
2. Position flywheel (Figure 2, Item 5) to its mounting location on crankshaft flange (Figure 2, Item 1) using reference marks (Figure 2, Items 2 and 3) applied prior to removal as a guide.
3. Support flywheel (Figure 2, Item 5) on crankshaft flange (Figure 2, Item 1).

NOTE

Apply engine oil to threads and undercut of flywheel mounting screws prior to installation.

4. Secure flywheel (Figure 2, Item 5) to crankshaft flange (Figure 2, Item 1) by installing five new screws (Figure 2, Item 4) finger tight.
5. Secure five flywheel mounting screws (Figure 2, Item 4) in a diagonal pattern. Torque screws to 40-43 ft•lb (54-59 N•m).
6. Install AC generator assembly (WP 0049, Remove/Install 50/60 Hz AC Generator Assembly or WP 0050, Remove/Install 400 Hz AC Generator Assembly).
7. Install ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
8. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
9. Start engine and check for proper operation (TM 9-6115-749-10).
10. Repair as required.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

REMOVE/INSTALL CRANKCASE REAR BEARING CASE COVER

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
 Wrench, Torque, Click, Ratcheting, 3/8 in Drive, 75 ft•lb (WP 0162, Table 2, Item 41)

Materials/Parts

Cover, assembly, bearing case (WP 0139, Item 3)
 Bolt (8) (WP 0139, Item 6)
 Bolt (8) (WP 0139, Item 7)
 Gasket, bearing case (WP 0139, Item 1)
 Gasket, case cover (WP 0139, Item 2)
 Seal, oil (WP 0139, Item 5)
 Cleaning compound, solvent (WP 0163, Table 1, Item 10)
 Grease, electrically conductive (WP 0163, Table 1, Item 20)

Materials/Parts - cont'd

Lubricating oil, engine (WP 0163, Table 1, Item 23)
 Rag, wiping (WP 0163, Table 1, Item 31)

Personnel Required

91D (1)

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool
 Battery ground cable removed (WP 0036, Remove/Install Batteries)
 Engine removed from generator set (WP 0064, Remove/Install 50/60 Hz Engine Assembly or WP 0065, Remove/Install 400 Hz Engine Assembly)

REMOVE/INSTALL CRANKCASE REAR BEARING CASE COVER

Remove Crankcase Rear Bearing Case Cover

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate crankcase rear bearing case cover (Figure 1).

REMOVE/INSTALL CRANKCASE REAR BEARING CASE COVER – CONTINUED

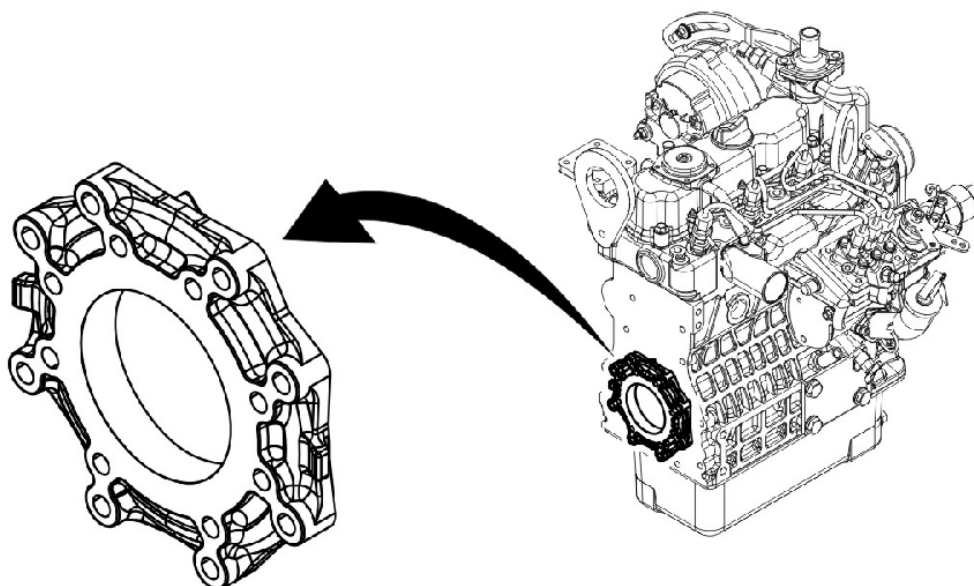


Figure 1. Crankcase Rear Bearing Case Cover - Location.

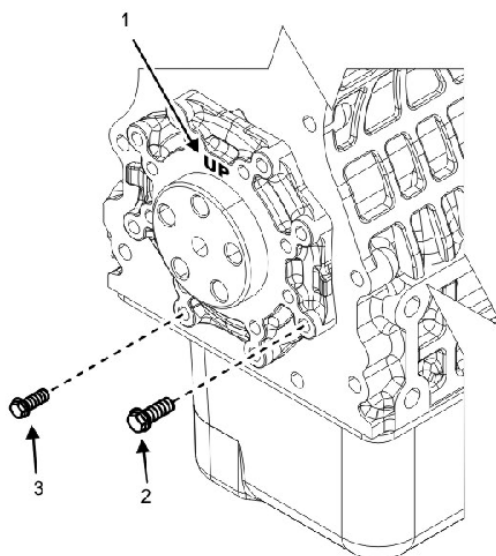


Figure 2. Crankcase Rear Bearing Case Cover - Removal.

3. Remove and discard eight 17-mm inner bearing case screws with captive lockwashers (Figure 2, Item 3) from rear bearing case cover (Figure 2, Item 1).

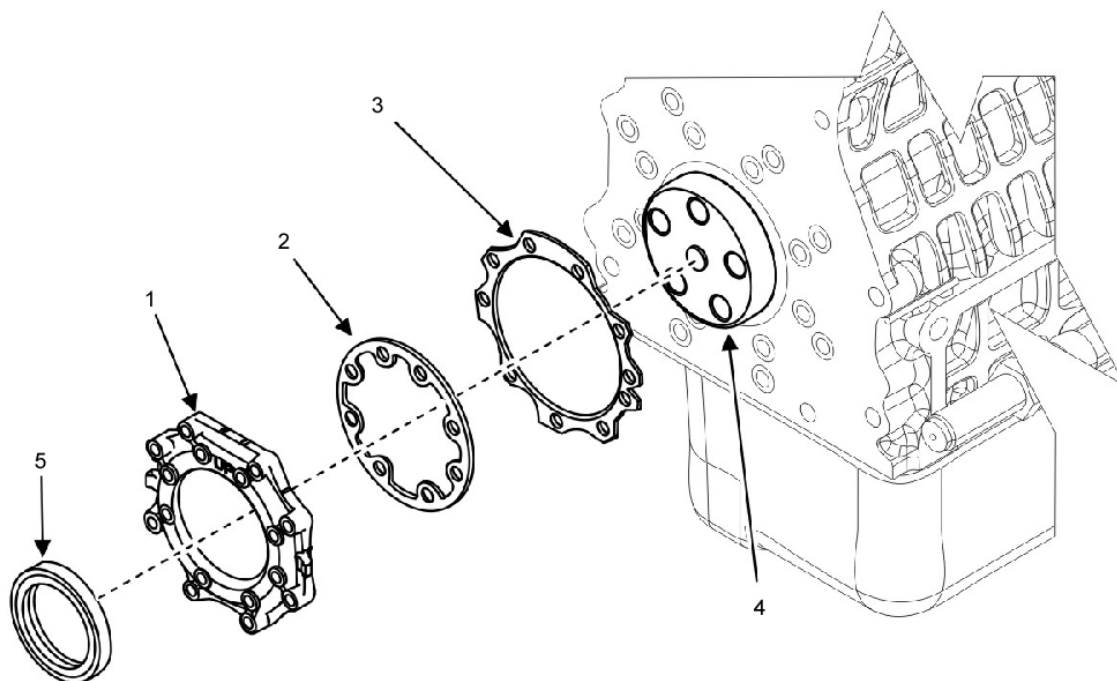
REMOVE/INSTALL CRANKCASE REAR BEARING CASE COVER – CONTINUED

Figure 3. Crankcase Rear Bearing Case Cover - Details.

4. Remove and discard eight 20-mm outer bearing case screws with captive lockwashers (Figure 2, Item 2) from rear bearing case cover (Figure 2, Item 1).
5. Remove rear bearing case cover (Figure 3, Item 1), oil seal (Figure 3, Item 5), and rear bearing case gasket (Figure 3, Item 2) from crankshaft (Figure 3, Item 4).
6. Discard rear bearing case gasket (Figure 3, Item 2).
7. Remove and discard oil seal (Figure 3, Item 5) from rear bearing case cover (Figure 3, Item 1).
8. Remove and discard rear bearing case cover gasket (Figure 3, Item 3) from engine block.
9. Remove any residual gasket material from both engine block and rear bearing case cover (Figure 3, Item 1).

END OF TASK**Inspect Crankcase Rear Bearing Case Cover**

1. Inspect rear bearing case cover (Figure 3, Item 1) for cracks or damage.
2. Replace rear bearing case cover (Figure 3, Item 1) if cracked or damaged.

END OF TASK**Install Crankcase Rear Bearing Case Cover****WARNING**

Compound cleaning solvent is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection is required. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply may cause injury or death to personnel.

REMOVE/INSTALL CRANKCASE REAR BEARING CASE COVER – CONTINUED

1. Clean mating surfaces of crankshaft (Figure 3, Item 4), engine block, and rear bearing case cover (Figure 3, Item 1) with compound cleaning solvent to remove dirt, debris, grease, and oil.
2. Dispose of soiled rags IAW local SOP.
3. Coat outer diameter of new oil seal (Figure 3, Item 5) with clean engine oil.
4. Install new oil seal (Figure 3, Item 5) to its mounting location in rear bearing case cover (Figure 3, Item 1). Be careful not to damage outer surface of seal during installation.

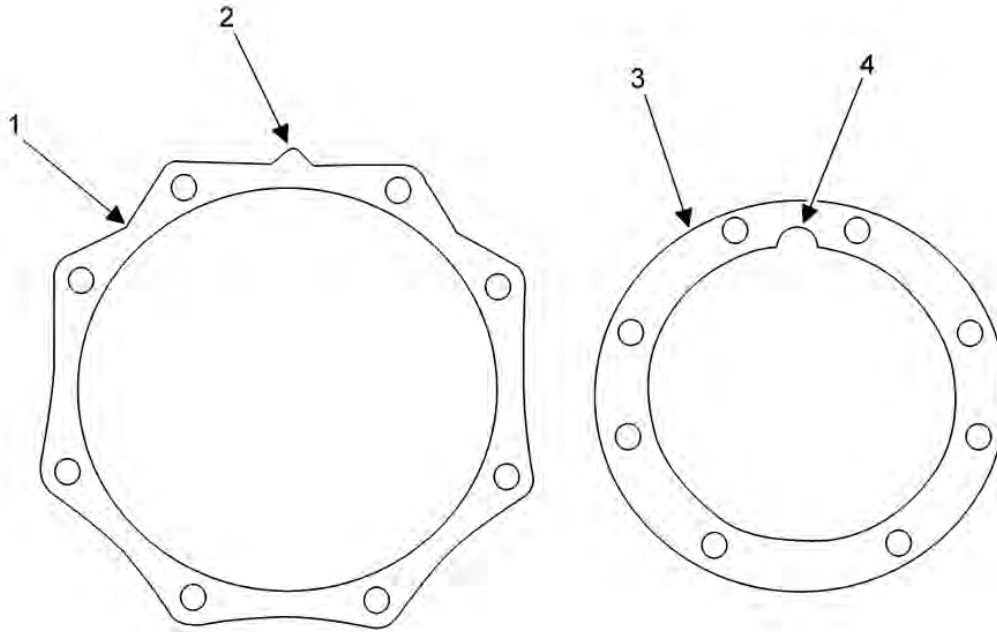


Figure 4. Crankcase Rear Bearing Case Cover - Component Alignment.

CAUTION

During assembly, rear bearing case gasket (Figure 3, Item 2), rear bearing case cover gasket (Figure 3, Item 3), and rear bearing case cover (Figure 3, Item 1) must be indexed as described in these steps to prevent engine oil leaks. Failure to comply may cause damage to equipment.

5. Position new rear bearing case cover gasket (Figure 4, Item 1) to its mounting location on engine block and align mounting holes so that triangular tip (Figure 4, Item 2) is facing toward top of engine.
6. Position new rear bearing case gasket (Figure 4, Item 3) to its mounting location on rear of bearing case cover (Figure 3, Item 1) with cutout (Figure 4, Item 4) facing top of bearing case cover.

NOTE

Be sure to locate rear bearing case cover so UP stamp on case cover is aligned with top of engine block as shown in Figure 2.

7. Position rear bearing case cover (Figure 3, Item 1), oil seal (Figure 3, Item 5), and rear bearing case gasket (Figure 3, Item 2) to its mounting position against engine block and align mounting holes.
8. Slide rear bearing case cover (Figure 3, Item 1), oil seal (Figure 3, Item 5), and rear bearing case gasket (Figure 3, Item 2) onto crankshaft (Figure 3, Item 4) being careful not to roll inner surface of oil seal.

REMOVE/INSTALL CRANKCASE REAR BEARING CASE COVER – CONTINUED

9. Secure rear bearing case cover (Figure 2, Item 1) to engine block by installing eight new 20-mm screws with captive lockwashers (Figure 2, Item 2) to outer perimeter holes of rear bearing case cover (Figure 2, Item 1) finger-tight.
10. Install eight new 17-mm screws with captive lockwashers (Figure 2, Item 3) to inner perimeter holes of rear bearing case cover (Figure 2, Item 1) finger-tight.
11. Torque all rear bearing case cover bolts installed in Steps 9 and 10 to 7-8 ft•lb (10-11 N•m) using a crossing pattern.
12. Install engine assembly (WP 0064, Remove/Install 50/60 Hz Engine Assembly or WP 0065, Remove/Install 400 Hz Engine Assembly).
13. Install negative ground cable to right-hand battery (WP 0036, Remove/Install Batteries).
14. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
15. Start engine and check for proper operation (TM 9-6115-749-10).
16. Repair as required.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE

LUBRICATION INSTRUCTIONS

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)

Materials/Parts

Antifreeze, ethylene glycol (WP 0163, Table 1, Item 2)

Lubricating oil, engine (WP 0163, Table 1, Item 23)

Lubricating oil, engine (WP 0163, Table 1, Item 24)

Lubricating oil, engine (WP 0163, Table 1, Item 25)

Rag, wiping (WP 0163, Table 1, Item 31)

References

A-A-52624A NOTICE 1

MIL-PRF-2104H

MIL-PRF-46167D NOTICE 1

MIL-A-53009A

TB 750-651

WP 0021, Service Cooling System

WP 0066, Service Lubrication System

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)

Engine cool

Personnel Required

91D (1)

LUBRICATION INSTRUCTIONS

The AMMPS 5 kW generator set uses a variety of lubricating and cooling fluids. Refer to Table 1 for the fluids and their applications.

WARNING

When operating, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow engine to cool before checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply may cause injury or death to personnel.

CAUTION

Ensure the lubrication and cooling systems have been filled to capacity before operating the unit. Failure to comply may cause damage to equipment.

Table 1. Lubrication Orders.

USAGE	FLUID/LUBRICANT	CAPACITIES	TEMPERATURES
Engine oil	MIL-PRF-2104H ^a OE/HDO-15/40	Crankcase and engine 3.9 qt (3.7 L) with filter	5 to 135 °F (-15 to 57 °C)
	MIL-PRF-2104H OE/HDO-10		-15 to 5 °F (-26 to -15 °C)

LUBRICATION INSTRUCTIONS – CONTINUED**Table 1. Lubrication Orders. – Continued**

USAGE	FLUID/LUBRICANT	CAPACITIES	TEMPERATURES
	MIL-PRF-46167D NOTICE 1 ^b		-50 to 40 °F (-46 to 4 °C)
Engine antifreeze	A-A-52624A NOTICE 1 ^c	Radiator and engine 5.3 qt (5 L)	-50 to 135 °F (-46 to 57 °C)
Hinge/latch lubrication	MIL-PRF-2104H OE/HDO-15/40	Not applicable	Not applicable

^aPerformance Specification, Lubrication Oil, Internal Combustion Engine, Combat/Tactical Service.

^bPerformance Specification, Lubrication Oil, Internal Combustion Engine, Arctic.

^cCommercial Item Description: Antifreeze, Multi-engine Type.

CHANGE ENGINE OIL AND ENGINE OIL FILTER

See Table 2 and WP 0066, Service Lubrication System.

Table 2. Table of Lubricants - Engine.

SPECIFICATION	TYPE OF LUBRICANT	FREQUENCY	TEMPERATURE
MIL-PRF-2104H OE/HDO-15/40	Engine oil	500 h or 6 months	5 to 135 °F (-15 to 57 °C)
MIL-PRF-2104H OE/HDO-10			-15 to 5 °F (-26 to -15 °C)
MIL-PRF-46167D NOTICE 1			-50 to 40 °F (-46 to 4 °C)

END OF TASK**CHANGE ENGINE COOLANT**

See Table 3 and WP 0021, Service Cooling System.

Table 3. Table of Coolants - Engine.

SPECIFICATION	TYPE OF LUBRICANT	FREQUENCY	TEMPERATURE
A-A-52624A NOTICE 1	Antifreeze	1,500 h or 1 year	-50 to 135 °F (-45 to 57 °C)
MIL-A-53009A ^a	Liquid Cooling System Corrosion Inhibitor	See TB 750-651 ^b	40 to 135 °F (4 to 57 °C)

CHANGE ENGINE COOLANT – CONTINUED

^aMilitary Specification, Additive, Antifreeze Extender, Liquid Cooling Systems.

^bUse of Antifreeze Solutions, Antifreeze Extender, Cleaning Compounds, and Test Kit in Engine Cooling Systems.

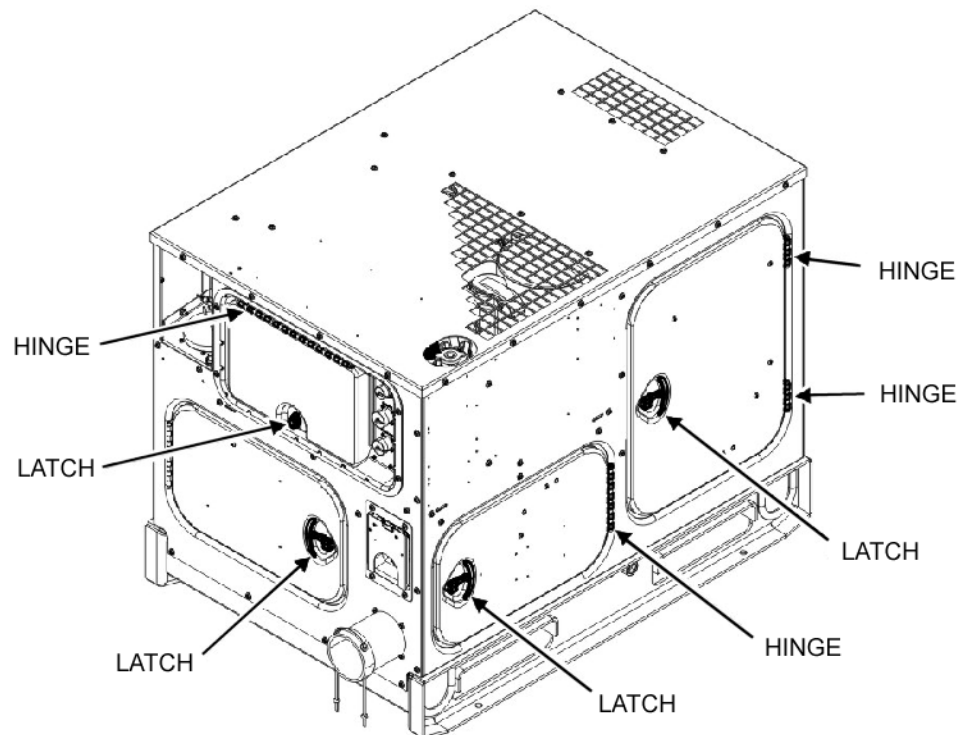
END OF TASK**LUBRICATE HINGES**

Figure 1. Hinge Locations - Rear and Right-Side.

1. Open doors (Figure 1 and Figure 2).
2. Apply one drop of lubrication oil (Table 4) to each hinge/latch.
3. Cycle door through three open-close sequences.

LUBRICATE HINGES – CONTINUED

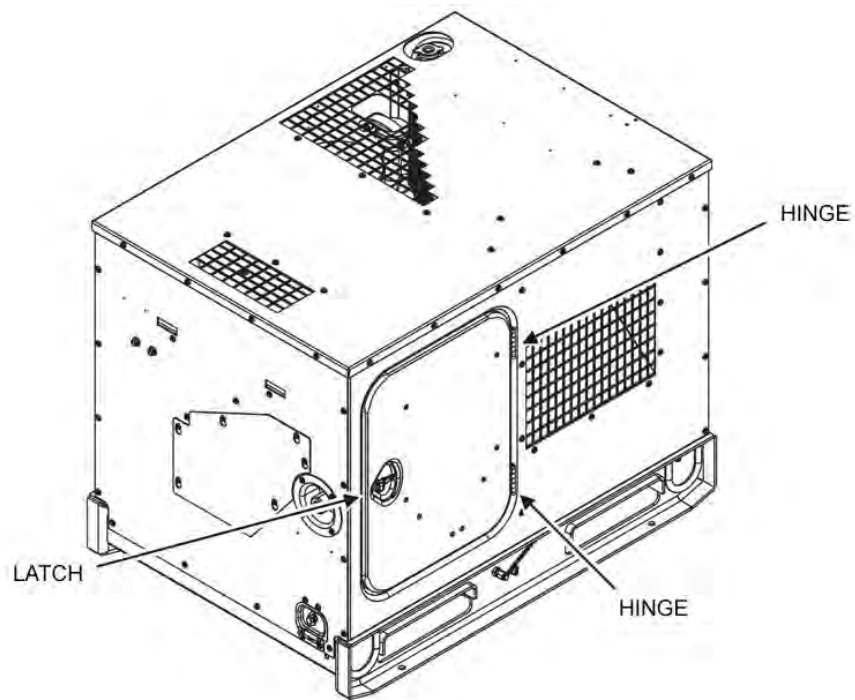


Figure 2. Hinge Locations - Front and Left-Side.

NOTE

Dispose of soiled rags IAW local SOP.

4. Wipe excess oil from hinge/latch.
5. Repeat Steps 1 through 4 for each door.

Table 4. Table of Lubricant - Hinges.

SPECIFICATION	TYPE OF LUBRICANT	FREQUENCY	METHOD OF APPLICATION
MIL-PRF-2104H	MIL-PRF-2104H OE/HDO-15/40	500 h	Oil can, mechanic's flexible

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE

TORQUE LIMITS

SCOPE

This WP provides general torque limits for fasteners used on the AMMPS 5 kW generator set. Special torque limits are indicated in Table 1. Table 2 provides nominal torque limits to be used when they are not indicated in Table 1.

The following formula should be used to determine the setting used on the torque wrench when using a crowfoot extension: (SOCKET, CROWFOOT WRENCH HEAD 17105) $M1 = M2 \times L1 / L2$. The values from the formula are defined in the list below.

TORQUE INSTRUCTIONS

Term	Definition
L1	The normal length of the torque wrench (from center of grip to center of drive).
L2	The length of the torque wrench plus the length of crowfoot adapter (measured from the center of crowfoot drive to center of wrench drive).
M1	The torque setting of the wrench (this is what is being calculated).
M2	The desired torque to be applied to the nut.

The example shows the calculation of the torque to be set on an 18-in wrench with a 4-in crowfoot adapter to obtain 80 ft•lb of torque.

$$M1 (65.45) = 80 \times 18/22.$$

When any extension is 90° from the torque wrench, no adjustment is necessary.

These general and special torque limits shall not be applied to fasteners that retain rubber components. The rubber components may be damaged before the correct torque limit is reached. If a special torque limit is not given in the maintenance instructions for rubber components, tighten the fastener until it touches the metal, and then tighten it one more turn.

Table 1. Special Torque Limits.

COMPONENT	THREAD DIAMETER AND PITCH	TORQUE	LUBRICATING OIL APPLICATION
Crankcase rear bearing case cover bolts	M8 - 1.25 mm	18-21 ft•lb 24.2-28.4 N•m	Not applied
Flywheel bolt	M10 - 1.25 mm	61-65 ft•lb 83.3-88.2 N•m	Applied
PCV flange bolt	M8 - 1.5 mm	83-91 ft•lb 113.0-123.0 N•m	Not applied
Main bearing cap bolt	M12 - 1.5 mm	69-72 ft•lb 93.2-98.1 N•m	Applied
Fuel injector bolt	M8 - 1.25 mm	18-21 ft•lb 24.2-28.4 N•m	Not applied

TORQUE INSTRUCTIONS – CONTINUED**Table 1. Special Torque Limits. – Continued**

COMPONENT	THREAD DIAMETER AND PITCH	TORQUE	LUBRICATING OIL APPLICATION
Fuel injector retainer bolt	Any	29 ft•lb 39.2 N•m	Not applied
Fuel pump drive gear nut	M14 - 1.5 mm	58-65 ft•lb 78.0-88.0 N•m	Not applied
High-pressure fuel lines bolt	M12 - 1.5 mm	22-25 ft•lb 29.4-34.3 N•m	Not applied
High-pressure fuel injector line nut	Any	22-25 ft•lb 29.0-34.0 N•m	Not applied
Fuel return line bolt	Any	69-87 in/lb 7.8-9.8 N•m	Not applied
Fuel injection pump mounting bolt	Any	17-21 ft•lb 23.0-28.0 N•m	Not applied
Fuel injector nozzle case nut	Any	30-33 ft•lb 39.2-44.1 N•m	Not applied
Fuel injection pump plunger plug	Any	22-26 ft•lb 30.0-35.0 N•m	Not applied

How to Use Torque Table

1. Measure the diameter of the fastener (Figure 1, Item 2).
2. Look down the left-hand column under the Diameter heading to find the diameter of the fastener.
3. Measure the distance between the thread ridges in millimeter to determine pitch (Figure 1, Item 1).
4. To locate torque value, look across to column matching description and size of fastener.

TORQUE INSTRUCTIONS – CONTINUED

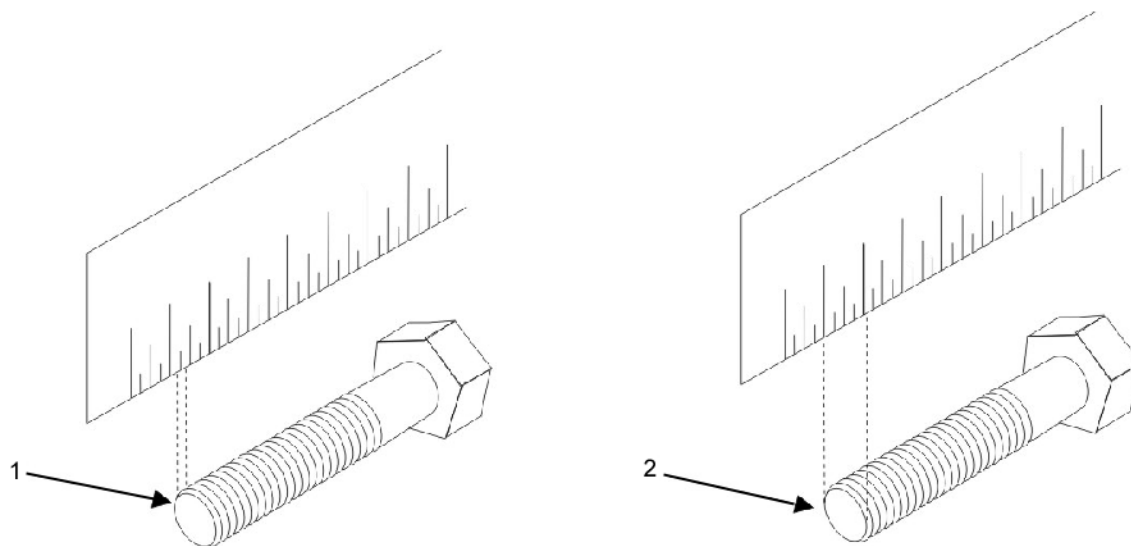


Figure 1. Screw/Bolt Measurement.

CAUTION

The torque values in Table 2 should be applied only to bolts marked 7 (7T strength). Failure to comply will cause damage to equipment.

NOTE

Apply 80% of listed torque value to fasteners tightened to aluminum alloys. Apply 60% of listed torque value to fasteners of 4T strength and all locknuts.

Table 2. Standard Torque Limits.

ITEM	THREAD DIAMETER AND PITCH	TORQUE
Capscrew (7T) and nut	M6 - 1.0 mm	7-9 ft•lb
		9.8-11.8 N•m
Capscrew (7T) and nut	M8 - 1.25 mm	17-21 ft•lb
		22.6-28.4 N•m
Capscrew (7T) and nut	M10 - 1.5 mm	33-40 ft•lb
		44.1-53.9 N•m
Capscrew (7T) and nut	M12 - 1.75 mm	58-72 ft•lb
		78.4-98.0 N•m
Capscrew (7T) and nut	M14 - 1.5 mm	94-108 ft•lb
		127.5-147.1 N•m
Capscrew (7T) and nut	M16 - 1.5 mm	159-174.0 ft•lb
		215.7-235.4 N•m
PT Plug	0.125 mm - NA	7 ft•lb
		9.8 N•m

TORQUE INSTRUCTIONS – CONTINUED**Table 2. Standard Torque Limits. – Continued**

ITEM	THREAD DIAMETER AND PITCH	TORQUE
PT plug	0.25 mm - NA	14 ft•lb 19.6 N•m
PT plug	0.375 mm - NA	22 ft•lb 29.4 N•m
PT plug	0.500 mm - NA	43 ft•lb 58.8 N•m
Pipe joint plug	M8 - NA	9-12 ft•lb 12.7-16.7 N•m
Pipe joint plug	M10 - NA	14-19 ft•lb 19.6-18.7 N•m
Pipe joint plug	M12 - NA	18-25 ft•lb 24.5-34.3 N•m
Pipe joint plug	M14 - NA	29-36 ft•lb 39.2-49.0 N•m
Pipe joint plug	M16 - NA	36-43 ft•lb 49.0-58.8 N•m

END OF WORK PACKAGE

CHAPTER 4

SUSTAINMENT TROUBLESHOOTING PROCEDURES
FOR
AMMPS 5 KW GENERATOR SET

SUSTAINMENT MAINTENANCE
SUSTAINMENT TROUBLESHOOTING INDEX

GENERAL TROUBLESHOOTING INFORMATION

NOTE

Always perform Sustainment PMCS prior to beginning any troubleshooting procedure (WP 0092).

Sustainment maintenance is responsible for repair and/or replacement of failed LRUs as identified by field maintenance. There are no specific troubleshooting procedures for sustainment maintenance. The malfunction/symptom index found below lists malfunction(s) identified at the field level and their related sustainment maintenance corrective action (by WP). If engine or AC generator overhaul is required, notify your supervisor.

SYMPTOM TROUBLESHOOTING PROCEDURES INDEX

Malfunction/Symptom	Troubleshooting Procedure
1. Symptom: Generator set inoperable.	WP 0090
2. Symptom: Failed LRU as determined by field maintenance.	WP 0090

END OF WORK PACKAGE

SUSTAINMENT MAINTENANCE
SUSTAINMENT TROUBLESHOOTING PROCEDURES

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162,
Table 2, Item 33)

References

WP 0004, Troubleshooting Index
WP 0092, Sustainment PMCS, Including Lubrication
Instructions

Personnel Required

91D (1)

GENERATOR SET**NOTE**

Always perform Sustainment PMCS prior to beginning any troubleshooting procedure (WP 0092, Sustainment PMCS).

TROUBLESHOOTING PROCEDURE(S)**SYMPTOM**

Generator set inoperable.

SYMPTOM

Failed LRU as determined by field maintenance.

CORRECTIVE ACTION

Repair/replace failed component(s) IAW maintenance procedures contained in WP 0004, Troubleshooting Index. If symptom continues, notify your supervisor.

END OF WORK PACKAGE

CHAPTER 5

SUSTAINMENT MAINTENANCE INSTRUCTIONS

FOR

AMMPS 5 KW GENERATOR SET

SUSTAINMENT MAINTENANCE
SUSTAINMENT PMCS INTRODUCTION

INITIAL SETUP:

Not Applicable

INTRODUCTION

WP 0092 contains information required to perform sustainment maintenance PMCS. All PMCS for the AMMPS 5 kW generator set are completed by the operator (TM 9-6115-749-10) or by field maintenance personnel (WP 0016, Field PMCS, Including Lubrication Instructions). There are no PMCS tasks to be performed by sustainment maintenance personnel.

END OF WORK PACKAGE

SUSTAINMENT MAINTENANCE
SUSTAINMENT PMCS, INCLUDING LUBRICATION INSTRUCTIONS

INITIAL SETUP:

Not Applicable

Table 1. Sustainment PMCS.

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			There are no PMCS tasks to be performed by sustainment maintenance personnel. All PMCS for the AMMPS 5 kW generator set are completed by the operator (TM 9-6115-749-10) or by field maintenance personnel (WP 0016, Field PMCS, Including Lubrication Instructions).	

MANDATORY REPLACEMENT PARTS

There are no replacement parts required for these PMCS procedures.

LUBRICATION INSTRUCTIONS

There are no scheduled lubrication intervals for external components (i.e. hinges and latches). Lubrication instructions are contained in WP 0087, Lubrication Instructions.

END OF WORK PACKAGE

SUSTAINMENT MAINTENANCE
GENERAL MAINTENANCE

INITIAL SETUP:**Test Equipment**

Cable, Local Control (WP 0162, Table 2, Item 5)
 Cable, Remote Control (WP 0162, Table 2, Item 6)
 Cable, Remote Control (WP 0162, Table 2, Item 7)
 Test Set, Electronic Systems (WP 0162, Table 2, Item 27)

Tools and Special Tools

Cable, Auxiliary with NATO Plug (WP 0162, Table 2, Item 4)
 Crimping, Tool, Terminal (WP 0162, Table 2, Item 10)
 Crimping, Tool, Terminal, Hand (WP 0162, Table 2, Item 11)
 Oiler, Hand (WP 0162, Table 2, Item 18)
 Remover, Electrical Contact Extractor Tool (WP 0162, Table 2, Item 22)
 Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
 Tool, Rivet Nut (WP 0162, Table 2, Item 35)

Materials/Parts

Boot, dust and moisture (19) (WP 0153, Item 30)
 Boot, dust and moisture seal (2) (WP 0154, Item 13)
 Cap, sealing (2) (WP 0144, Item 2)
 Cap, sealing (2) (WP 0144, Item 5)
 Cap, sealing (3) (WP 0144, Item 8)
 Cap, sealing (3) (WP 0144, Item 15)
 Connector, electrical magnetic sensor (WP 0153, Item 61)
 Connector, plug, electrical (WP 0153, Item 3)
 Connector, plug, electrical (WP 0153, Item 6)
 Connector, plug, electrical (WP 0153, Item 8)
 Contact, electrical, 16-20 AWG (2) (WP 0153, Item 45)
 Contact, electrical, 18-20 AWG (4) (WP 0153, Item 29)
 Contact, electrical, 22-16 AWG (33) (WP 0153, Item 14)
 Contact, electrical, 22-16 AWG (22) (WP 0153, Item 22)
 Contact, pin, 16-18 AWG (3) (WP 0153, Item 50)
 Nut, plain, clinch (WP 0102, Item 4)
 Plug, expansion (1) (WP 0144, Item 6)

Materials/Parts - cont'd

Terminal, lug, ring, M8, 12-10 AWG (4) (WP 0154, Item 4)
 Terminal, lug, ring, 3/8 IN, 12-10 AWG (2) (WP 0154, Item 9)
 Terminal, lug, 16-14 AWG (WP 0153, Item 19)
 Terminal, lug, 16-20 AWG (2) (WP 0153, Item 63)
 Terminal, quick disconnect (3) (WP 0153, Item 52)
 Terminal, quick disconnect, 14-16 AWG (16) (WP 0153, Item 35)
 Terminal, taper, receptacle (2) (WP 0154, Item 12)
 Antifreeze, ethylene glycol, 1 gal (WP 0163, Table 1, Item 2)
 Baking soda (WP 0163, Table 1, Item 4)
 Brush, wire, scratch, brass (WP 0163, Table 1, Item 7)
 Distilled water, ACS (WP 0163, Table 1, Item 17)
 Fuel, diesel (WP 0163, Table 1, Item 18)
 Fuel, diesel (WP 0163, Table 1, Item 19)
 Lubricating oil, engine, preservation (WP 0163, Table 1, Item 26)
 Rag, wiping (WP 0163, Table 1, Item 31)
 Tape, pressure sensitive (WP 0163, Table 1, Item 36)

Personnel Required

91D (1)

References

WP 0009, Electrical System Troubleshooting without a DCS Code
 WP 0016, Field PMCS, Including Lubrication Instructions
 WP 0017, Remove/Install DCS
 WP 0018, Repair DCS
 WP 0019, Remove/Install Air Intake Hose Assemblies
 WP 0021, Service Cooling System
 WP 0039, Service Fuel System
 WP 0040, Remove/Install Fuel Manifold
 WP 0041, Remove/Install Fuel Pump, Main/Auxiliary
 WP 0043, Replace Fuel Filter/Water Separator Element
 WP 0066, Service Lubrication System
 WP 0087, Lubrication Instructions

INITIAL SETUP: – CONTINUED

Plug, protective, dust and moisture seal (2) (WP 0154, Item 15)	Equipment Condition
Seal (2) (WP 0154, Item 16)	Engine control switch OFF (TM 9-6115-749-10, WP 0005)
Seal (3) (WP 0153, Item 48)	Engine cool
Terminal, disconnect (WP 0153, Item 57)	Battery ground cable removed (WP 0036, Remove/Install Batteries)
Terminal, lug (4) (WP 0153, Item 58)	
Terminal, lug, ring (WP 0154, Item 2)	
Terminal, lug, ring (WP 0154, Item 10)	

GENERAL MAINTENANCE

This work package provides general maintenance procedures for using a fire extinguisher, understanding general fuel requirements, using a multimeter, jump-starting the generator set, cleaning battery terminals, repairing electrical connectors, accessing log files on DCS, using InPower AMMPS for troubleshooting and updating, and preparation for storage.

Using A Fire Extinguisher

Do not use a fire extinguisher without reading the instructions and receiving proper training. When using a fire extinguisher, choose the proper type of fire extinguisher for the class of fire. Be sure to use a type "A" on ordinary materials (paper, cardboard, and most plastics), type "B" on combustible or combustibles (diesel, gas, grease, and oil), type "C" on electrical fires, type "D" on combustible metal/chemical fires, or a multipurpose extinguisher designated with the proper letter for the class fire. For example, an "ABC" extinguisher will handle class "A," "B," and "C" fires. Using the improper fire extinguisher can result in spreading of the fire and failure to extinguish. Failure to comply may cause injury or death to personnel. Do not attempt to extinguish a fire that is large in size. Do not attempt to extinguish a fire when there is no clear exit visible. Be sure building is evacuated. Call for help IAW local SOP. Stay low to avoid smoke. Failure to comply may cause injury or death to personnel.

1. Determine the class of fire ("A", "B", "C", or "D").
2. Choose the correct type of extinguisher.
3. Pull the pin of the extinguisher.
4. Aim the extinguisher at the base of the fire.
5. Sweep back and forth toward the fire.
6. Continue until fire is extinguished.
7. Recharge or dispose of extinguisher IAW local SOP.

END OF TASK**General Fuel Requirements****WARNING**

Fuel is combustible and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash skin and change clothing promptly if in contact with fuel. Failure to comply may cause injury or death to personnel.

GENERAL MAINTENANCE – CONTINUED**WARNING**

Fuels used in the generator set are combustible. Ensure fuel source grounding strap is connected to unit fuel fill grounding stud (static grounding). When filling the fuel tank, maintain metal-to-metal contact between filler nozzle and fuel tank opening to eliminate **ESD**. Fire and possible explosion can result. Failure to comply may cause injury or death to personnel.

WARNING

Fuels used in the generator set are combustible. Do not smoke or use open flames when performing maintenance. Fire and possible explosion may result. Failure to comply may cause injury or death to personnel and damage to equipment.

WARNING

Hot engine surfaces from the engine and generator circuitry are possible sources of ignition. When hot refueling with DF-1, DF-2, JP5, or JP8, avoid fuel splash and fuel spill. Do not smoke or use open flame when performing refueling. Remember PMCS is still required. Flames and possible explosion may result. Failure to comply may cause injury or death to personnel.

NOTE

DF-2 and JP8 are the types of fuel for the generator set. See Table 1.

Table 1. Fuel.

AMBIENT TEMPERATURE	FUEL
-50 to 135 °F (-46 to 57.2 °C)	MIL-DTL-83133G ^a JP8
25 to 135 °F (-3.9 to 57.2 °C)	A-A-52557 ^b GR 2-D
0 to 20 °F (-17.7 to -6.7 °C)	A-A-52557 GR 1-D

^aTurbine Fuel, Aviation, Kerosene Type, JP-8 (NATO F-34), NATO F-35, and JP-8+100 (NATO F-37).

^bFuel Oil, Diesel; for Posts, Camps and Stations.

END OF TASK**Using a Multimeter**

1. Select/turn dial for option to be used:
 - a. Ohms for resistance, continuity, and short circuit.
 - b. Volts for voltage.
 - c. Amperes for current.

GENERAL MAINTENANCE – CONTINUED**WARNING**

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

CAUTION

Only use instruments known to be in good working order. When an instrument is used to measure resistance, proper function should be confirmed by touching metal tips of leads together and observing for minimum resistance indication. Failure to comply may cause damage to equipment.

2. Measure resistance value.
 - a. Connect multimeter leads to leads of item being checked.
 - b. Use red lead for positive terminal.
 - c. Use black lead for negative terminal.
 - d. Observe display for reading.
 - e. Compare reading to specifications.
3. Check for opens or continuity.
 - a. Connect multimeter leads to wiring circuit being checked.
 - b. Observe display for reading.
 - c. Consult specifications for maximum permissible reading.
4. Check for short circuit, wire to wire.
 - a. Connect multimeter leads to wires being checked.
 - b. Observe display for reading.
 - c. Reading must be greater than 100 kΩ wire to wire or short exists.
5. Check for short circuit to ground.
 - a. Connect one multimeter lead to wire being checked.
 - b. Touch multimeter probe to bare metal, such as engine block.
 - c. Observe display for reading.
 - d. Repeat Steps a through c for remaining wires in circuit.
 - e. Reading must be greater than 100 kΩ or short to ground exists.
6. Place proper lead on proper terminal to check voltage:
 - a. Use red lead for positive terminal.
 - b. Use black lead for negative terminal.
 - c. Observe display for reading.
 - d. Compare reading to specifications.
7. Place proper lead on proper terminal to check current:

GENERAL MAINTENANCE – CONTINUED

- a. Use red lead for positive terminal.
- b. Use black lead for negative terminal.
- c. Observe display for reading.
- d. Compare reading to specifications.

END OF TASK**Jump-Starting the Generator Set**

Jump-starting requires the use of the NATO slave receptacle. NATO slave cables are required to jump-start a 24 VDC system. The generator set cannot be jump-started with a 12 VDC system. Ensure the vehicle/equipment being used to jump-start the generator set is a 24 VDC system.

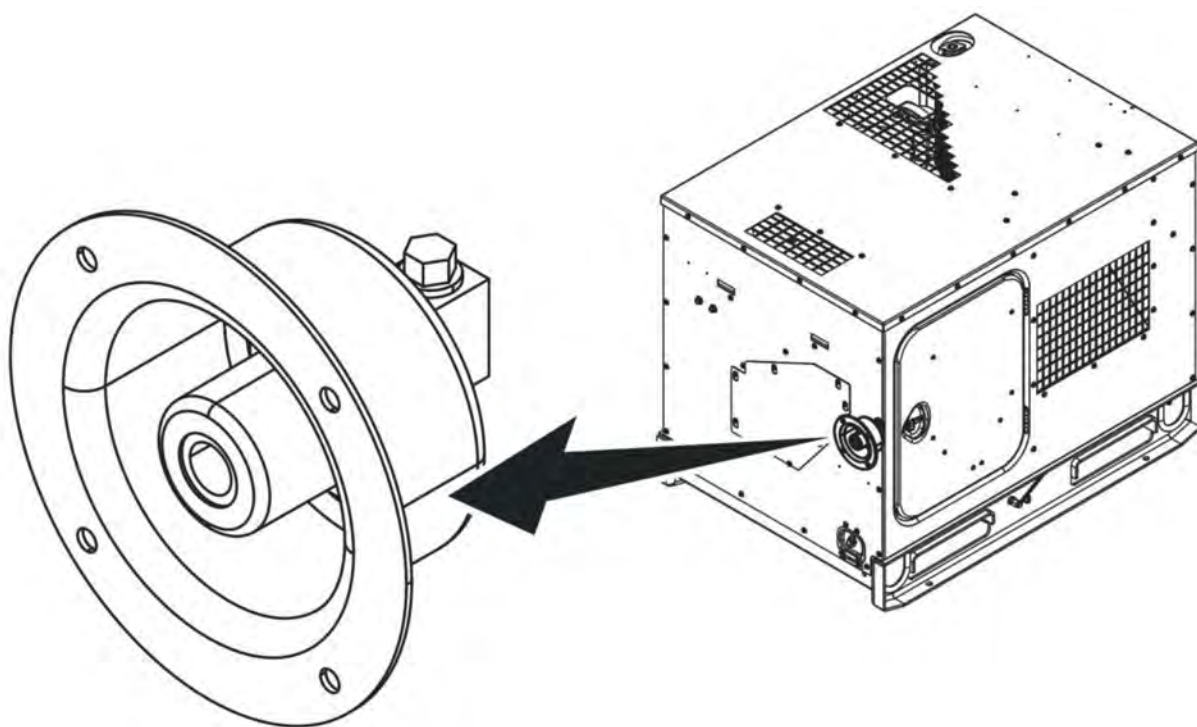


Figure 1. NATO Slave Receptacle - Location.

WARNING

NATO slave receptacle is electrically live at all times and is not protected by a fuse. Disconnecting main Direct Current (DC) circuit breaker does not ensure the circuit is dead. This circuit is only dead when the batteries are fully disconnected. Disconnect both batteries before performing maintenance on the slave receptacle. Failure to comply may cause injury or death to personnel.

GENERAL MAINTENANCE – CONTINUED**WARNING**

Ensure equipment/vehicles being used to jump-start the generator set are not touching. Touching of metal surfaces can cause improper grounding. Do not allow the cable ends to touch each other or any part of the generator set/vehicle/equipment other than the NATO slave receptacle. May result in damage to the electrical system of the generator set/vehicle/equipment. Failure to comply may cause injury or death to personnel.

WARNING

High voltage is produced when generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Do not ground yourself in standing water. Never attempt to connect or disconnect load cables while the generator set is running. Failure to comply may cause injury or death to personnel.

1. Move the vehicle/equipment being used to jump-start close enough to the generator set that the cables reach.
2. Ensure the engine control switch on the generator set is OFF (TM 9-6115-749-10).
3. Ensure the vehicle/equipment being used to jump-start is OFF.
4. Locate the NATO slave receptacle on the front body panel (Figure 1).
5. Remove the NATO slave receptacle cover.
6. Ensure NATO slave cable ends are free of dirt and debris.
7. Ensure NATO slave receptacles are free of dirt and debris.

WARNING

Ensure equipment/vehicles being used to jump-start the generator set are not touching. Touching of metal surfaces can cause improper grounding. Do not allow the cable ends to touch each other or any part of the generator set/vehicle/equipment other than the NATO slave receptacle. May result in damage to the electrical system of the generator set/vehicle/equipment. Failure to comply may cause injury or death to personnel.

8. Connect the NATO slave cable to the generator set.
9. Turn on the vehicle/equipment being used to jump-start the generator set.
10. Connect the other end of the NATO slave cable to the vehicle/equipment being used to jump-start.
11. Allow the generator set to charge for 10 min.

CAUTION

Do not crank engine in excess of 15 sec. Allow starter to cool for at least 15 sec between attempted starts. Failure to comply may cause damage to equipment.

12. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
13. Start engine and check for proper operation.
14. Ensure proper operation of the generator set.
15. Remove the NATO slave cable from the vehicle/equipment being used to jump-start.
16. Remove the NATO slave cable from the generator set.
17. Replace the cap on the NATO slave receptacle.

END OF TASK

GENERAL MAINTENANCE – CONTINUED**Clean Battery Posts****WARNING**

High voltage is produced when this generator set is in operation. Ensure engine control and DEAD CRANK switches are set to OFF, negative battery cable is disconnected, and unit is completely shut down and free of any power source before attempting any troubleshooting or maintenance on unit. Failure to comply may cause injury or death to personnel.

WARNING

The right-hand battery negative lead that connects directly to the grounding stud must be disconnected prior to disconnecting or removing batteries. Follow procedural steps in exact order given for removal and installation. Failure to comply may cause injury or death to personnel.

WARNING

Shut down generator sets before performing inspection of load cables. Failure to comply may cause injury or death to personnel by electrocution.

WARNING

Batteries give off combustible gas. Do not smoke or use open flame when performing maintenance. Failure to comply may cause injury or death to personnel and damage to equipment.

WARNING

Battery acid can cause burns to skin and cause eye injury. Wear safety goggles and chemical gloves and avoid acid splash while working on the batteries. Failure to comply may cause injury or death to personnel.

WARNING

Lifting batteries may cause back strain. Ensure proper lifting techniques are used when lifting batteries. Failure to comply may cause injury or death to personnel.

1. Remove battery cables from battery terminals (WP 0036, Remove/Install Batteries).
2. Apply a one-part baking soda (sodium bicarbonate) to twenty-parts water solution to terminals.
3. Let terminals stand in solution for 2-3 min.
4. Clean terminals with a wire brush.
5. Dry battery terminals with a wiping rag.
6. Install battery cables to battery terminals (WP 0036, Remove/Install Batteries).

END OF TASK

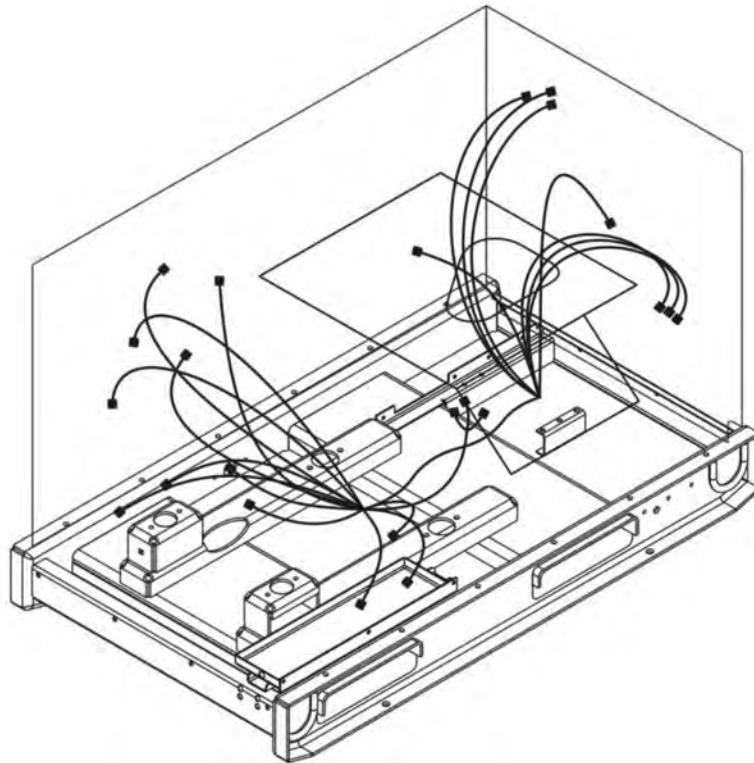
GENERAL MAINTENANCE – CONTINUED**Repair Electrical Connectors**

Figure 2. Wiring Harness - Location.

NOTE

Several types of connectors are used on the AMMPS generator set wiring harness. Each type of electrical connector can be replaced without removing the entire wiring harness from the unit. Replacement steps for each type of electrical connector are given below. A table at the end of each repair step identifies the relevant electrical connector, contact type, and number of contacts required for each component connector type.

See the Foldout Pages, electrical wiring diagrams in the rear of this manual for locations of the various types of electrical connectors. Electrical connector numbers in the tables are keyed to the Engine Harness foldout diagram at the back of this manual.

1. Ensure equipment conditions are met in order presented in initial setup.
2. Locate electrical connector or wiring harness (Figure 2) that requires repair.
3. Replace simple crimp-on connector (Table 2).

GENERAL MAINTENANCE – CONTINUED

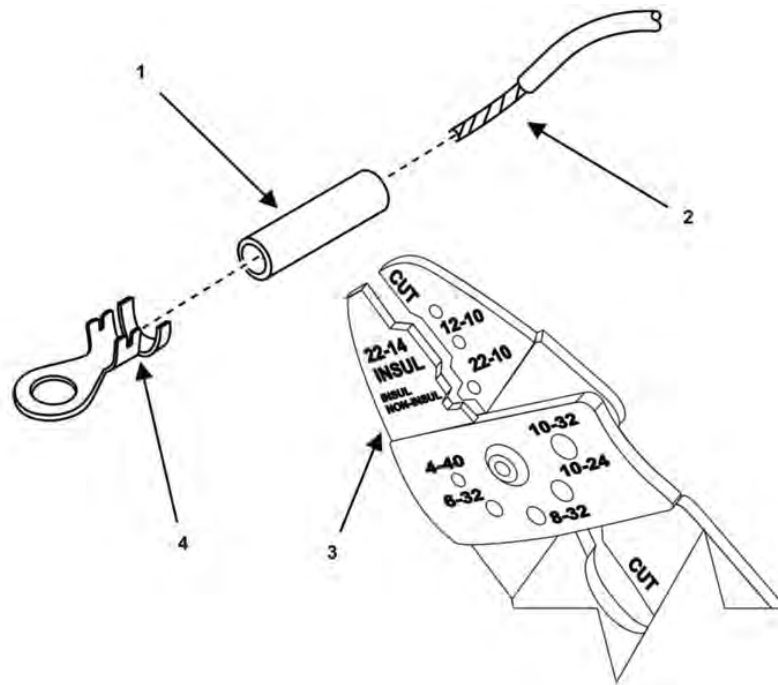


Figure 3. Simple Crimp-on Ring Connector.

- a. Identify failed electrical component connector (Figure 3, Item 4).
- b. Cut and discard old connector (Figure 3, Item 4) from wire lead (Figure 3, Item 2) at base of old connector.
- c. Install a length of new shrink wrap (Figure 3, Item 1) long enough to cover the crimp area of new connector (Figure 3, Item 4) onto wire lead (Figure 3, Item 2).
- d. Strip insulation from wire lead (Figure 3, Item 2) equal to depth of new connector well.
- e. Place bare wire of wire lead (Figure 3, Item 2) into new connector (Figure 3, Item 4) well and crimp to secure connector (Figure 3, Item 4) to wire lead (Figure 3, Item 2) using a crimping tool (Figure 3, Item 3).
- f. Test new connector (Figure 3, Item 4) using a multimeter to verify continuity is present using wire diagram as a guide to identify the correct circuit.
- g. Slide shrink wrap (Figure 3, Item 1) over newly crimped connection and heat to form a tight seal.
- h. Install new connector (Figure 3, Item 4) to electrical component.
- i. Check operation of electrical component for proper operation. Repair as required.

Table 2. Crimp-on Ring Connector Repair.

WIRING HARNESS	ELECTRICAL COMPONENT	CONNECTOR TYPE	NO. CONTACTS
Engine Wiring Harness	DEAD CRANK SWITCH	Ring	3
Engine Wiring Harness	Battery-Charging Alternator	Terminal	1

GENERAL MAINTENANCE – CONTINUED**Table 2. Crimp-on Ring Connector Repair. – Continued**

WIRING HARNESS	ELECTRICAL COMPONENT	CONNECTOR TYPE	NO. CONTACTS
Engine Wiring Harness	Starter Solenoid	Ring	1
Engine Wiring Harness	Glow Plugs	Ring	1
Power Wiring Harness	Battery-Charging Alternator (B+)	Ring	1
Power Wiring Harness	Battery-Charging Alternator (Ground)	Ring	1
Power Wiring Harness	Starter (B+)	Ring	1
Power Wiring Harness	Starter (B-)	Ring	2
Power Wiring Harness	Main DC Circuit Breaker (B+)	Ring	3

4. Repair multipin bulkhead-mounted connector (Table 3).

NOTE

This task contains typical repair instructions for the multipin connectors used on the 5 kW AMMPS DCS and engine speed sensor. There are four different connectors used on the generator set. Each one varies in the number of pins/sockets used in the connector. Repair of each connector uses the same procedure provided below. See Table 3 for the correct connector for your application.

- a. Disconnect cable connector from generator set component.
- b. Test wire/socket connections (Figure 4, Item 5) of electrical connector using a multimeter to determine failed socket(s) (Figure 4, Item 7) within the connector.
- c. Loosen two screws (Figure 4, Item 1) that secure strap of shell (Figure 4, Item 2) to cable (Figure 4, Item 8).
- d. Unscrew shell (Figure 4, Item 2) from connector housing (Figure 4, Item 4).
- e. Slide shell (Figure 4, Item 2) down cable (Figure 4, Item 8) to access back of connector housing (Figure 4, Item 4).
- f. Remove every wire/socket connection (Figure 4, Item 5) from rear of connector housing (Figure 4, Item 4) using electrical contact extractor tool (Figure 4, Item 6).
- g. Inspect all individual wire/socket connections for signs of obvious damage. Replace all damaged sockets (Figure 4, Item 7) while accessible.
- h. Inspect cable (Figure 4, Item 8), shell (Figure 4, Item 2), and connector housing (Figure 4, Item 4) for signs of obvious damage. Replace all damaged components as required.

GENERAL MAINTENANCE – CONTINUED

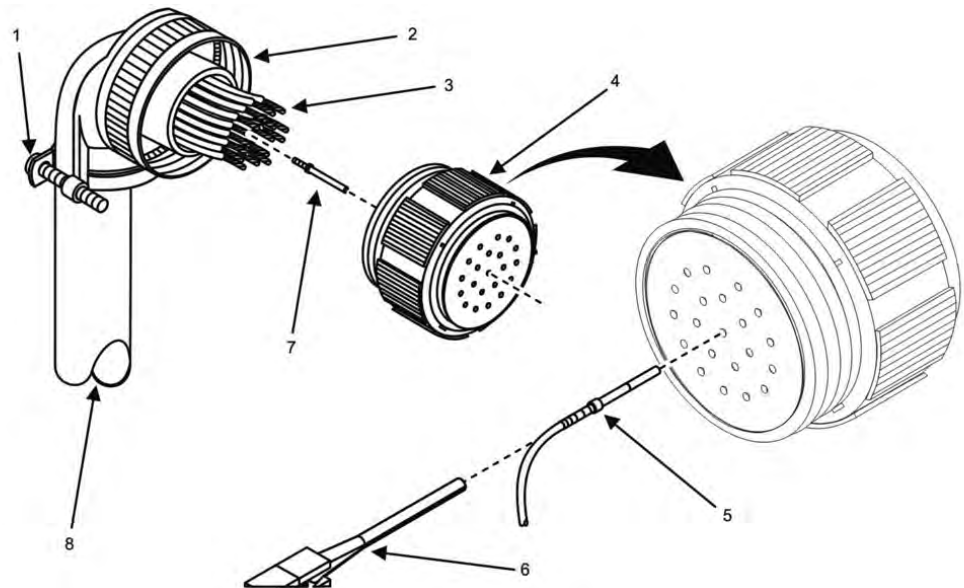


Figure 4. Multipin Connector Repair.

CAUTION

De-solder (see TB SIG 222) broken/damaged socket(s) (Figure 4, Item 7) and remove socket (Figure 4, Item 7) from cable wire (Figure 4, Item 3).

- i. Solder (see TB SIG 222) new socket(s) (Figure 4, Item 7) to cable wire (Figure 4, Item 3).
- j. Test new wire/socket connection(s) (Figure 4, Item 5) to ensure proper electrical flow.
- k. Insert all individual wire/socket connections (Figure 4, Item 5) into rear of connector housing (Figure 4, Item 4) using tags/markings applied during removal as a guide. Push wire/socket connections (Figure 4, Item 5) into connector housing (Figure 4, Item 4) locations by hand until each socket (Figure 4, Item 7) is fully seated and will not pull out.
- l. Slide shell (Figure 4, Item 2) over cable (Figure 4, Item 8) to its mounting location on connector housing (Figure 4, Item 4) and secure by screwing shell (Figure 4, Item 2) onto connector housing (Figure 4, Item 4).
- m. Tighten two screws (Figure 4, Item 1) to secure strap of shell (Figure 4, Item 2) to cable (Figure 4, Item 8) and relieve strain on cable (Figure 4, Item 8).

Table 3. Multipin Bulkhead-Mounted Connector Repair.

ELECTRICAL COMPONENT (CONNECTOR NUMBER)	CONTACT TYPE	NUMBER (NO.) CONTACTS
DCS (P1)	Socket	21
DCS (P2)	Socket	29
DCS (P3)	Socket	61

GENERAL MAINTENANCE – CONTINUED

Table 3. Multipin Bulkhead-Mounted Connector Repair. – Continued

ELECTRICAL COMPONENT (CONNECTOR NUMBER)	CONTACT TYPE	NUMBER (NO.) CONTACTS
Engine Speed Sensor (P14)	Pin	2

5. Repair square-type connector (Table 4).

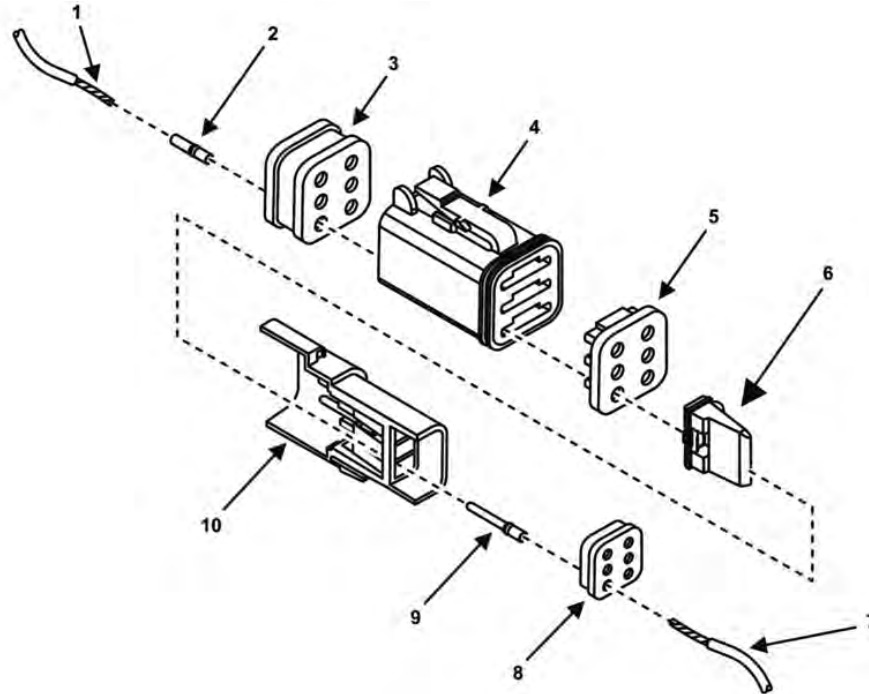


Figure 5. Square-Type Connector.

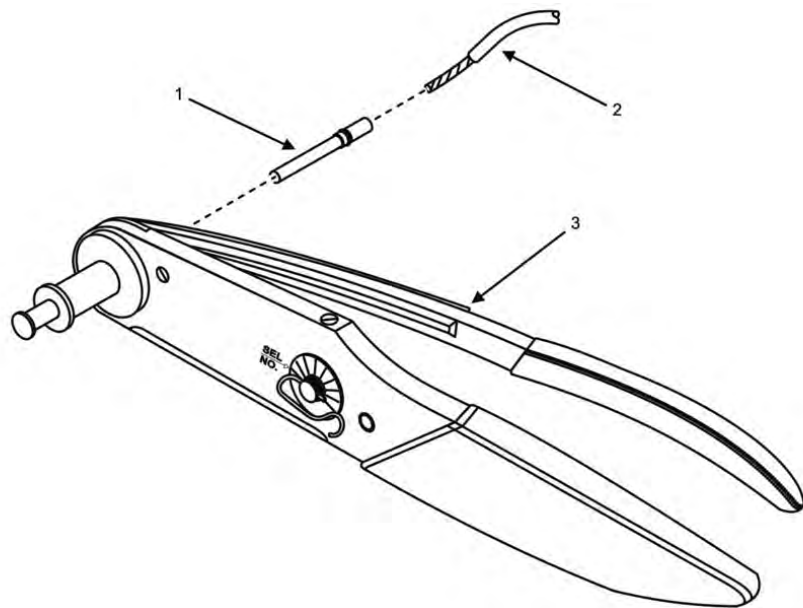
NOTE

Electrical connectors covered by this method may vary in design/shape but the procedure to repair them is the same.

- Identify electrical connector (Figure 5, Items 4 and 10) containing failed contact (Figure 5, Items 2 and 9).
- Disconnect connector (Figure 5, Items 4 and 10) from electrical component (Table 4).
- Test contact (Figure 5, Items 2 and 9) of electrical connector (Figure 5, Items 4 and 10) using a multi-meter to determine failed contact (Figure 5, Items 2 and 9) within the connector (Figure 5, Items 4 and 10).
- Remove wedge lock (Figure 5, Item 6) or retainer lock (Figure 5, Item 5) from connector (Figure 5, Items 4 and 10) by pulling straight out using needle nose pliers.
- Remove failed contact (Figure 5, Item 2 and 9) by gently pulling wire (Figure 5, Items 1 and 7) attached to failed contact (Figure 5, Item 2 and 9) from connector (Figure 5, Items 4 and 10) while, at the same time, releasing the locking finger of failed contact (Figure 5, Items 2 and 9) using the proper contact removal tool.

GENERAL MAINTENANCE – CONTINUED

- f. Hold seal (Figure 5, Items 3 and 8) in place using the removal tool as it may be displaced when pulling failed contact (Figure 5, Items 2 and 9) from rear of connector (Figure 5, Items 4 and 10) once failed contact (Figure 5, Items 2 and 9) is free from its locking finger.
- g. Cut failed contact (Figure 5, Items 2 and 9) from wire lead (Figure 5, Items 1 and 7) at base of failed contact (Figure 5, Items 2 and 9). Discard failed contact (Figure 5, Items 2 and 9).
- h. Strip insulation from wire lead (Figure 5, Items 1 and 7) to the length of new contact (Figure 5, Items 2 and 9) wire well.

**Figure 6. Square-Type Crimping Tool.****NOTE**

Crimping tool must be readjusted for each type/size of contact.

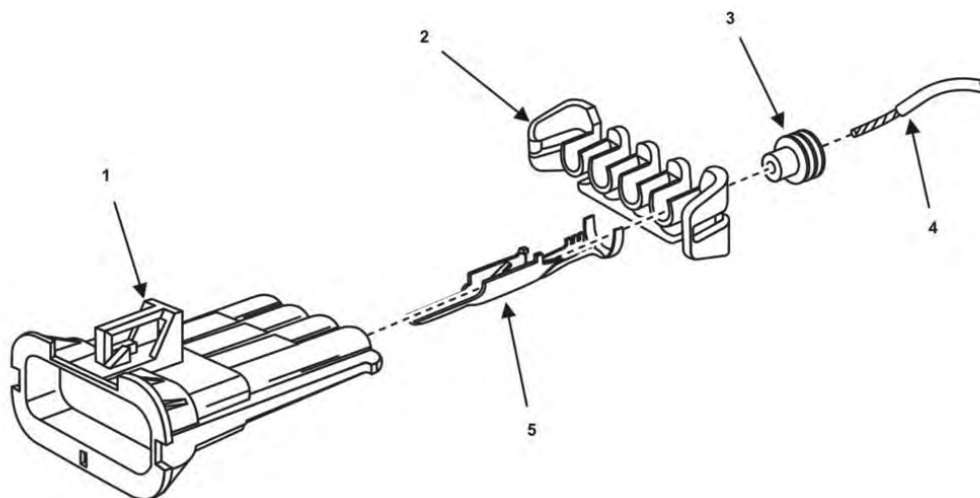
- i. Adjust crimping tool (Figure 6, Item 3) to the correct size of new contact (Figure 6, Item 1).
- j. Insert new contact (Figure 6, Item 1) into crimping tool (Figure 6, Item 3).
- k. Insert wire (Figure 6, Item 2) into contact (Figure 6, Item 1). Ensure all strands of wire are inside contact barrel. Contact (Figure 6, Item 1) must be centered between indicators of crimping tool (Figure 6, Item 3).
- l. Close handles of crimping tool (Figure 6, Item 3) until crimp cycle is completed.
- m. Release crimping tool handles and remove crimped contact (Figure 6, Item 1) from crimping tool (Figure 6, Item 3).
- n. Inspect crimped contact (Figure 6, Item 1) to ensure all strands of wire lead are inside contact barrel.
- o. Repeat Step 5i through 5n if all wire strands were not captured inside contact (Figure 6, Item 1).
- p. Grasp wire lead (Figure 5, Items 1 and 7) approximately 1.0 in (25 mm) behind new contact (Figure 5, Items 2 and 9).

GENERAL MAINTENANCE – CONTINUED

- q. Insert new contact (Figure 5, Items 2 and 9) straight into rear of seal (Figure 5, Items 3 and 8) until a click is felt.
- r. Pull gently on wire lead (Figure 5, Items 1 and 7) to verify contact (Figure 5, Items 2 and 9) is locked into connector (Figure 5, Items 4 and 10).
- s. Install wedge lock (Figure 5, Item 6) or retainer lock (Figure 5, Item 5) into connector (Figure 5, Items 4 and 10).
- t. Install repaired connector (Figure 5, Items 4 and 10) to electrical component.
- u. Check electrical component for proper operation. Repair as required.

Table 4. Square-Type Connector Repair.

ELECTRICAL COMPONENT (CONNECTOR NUMBER)	CONTACT TYPE	NO. CONTACTS
Winterization Kit (J20C)	Socket	3
Main Fuel Pump (P65)	Socket	2
Auxiliary Fuel Pump (P60)	Socket	2
Governor Actuator (P37)	Socket	2
G1 Field (P90)	Socket	2
Fuel Level Sensor (P70)	Socket	3
Spares (P75)	Socket	4
G1 Quad (P85)	Socket	2
Output Box (P500)	Socket	33

**Figure 7. Flat-Type Pin Connector.**

GENERAL MAINTENANCE – CONTINUED**NOTE**

The flat-type electrical connectors used on the AMMPS 5 kW generator set wiring harness are all of the pin type. The mating connectors are integral parts of the electrical components to which they are attached. The female type connectors attached to various electrical components are not repairable and therefore not depicted.

6. Repair flat-type connector (Table 5).
 - a. Identify electrical connector containing failed contact.
 - b. Disconnect wiring harness from electrical component.
 - c. Test contacts (Figure 7, Item 5) of electrical connector using a multimeter to determine failed contact within the connector.
 - d. Pull connector lock (Figure 7, Item 2) from rear of electrical connector shell (Figure 7, Item 1).
 - e. Remove failed contact (Figure 7, Item 5) by gently pulling wire lead (Figure 7, Item 4) attached to failed contact (Figure 7, Item 5) from rear of connector shell (Figure 7, Item 1) while, at the same time, releasing contact (Figure 7, Item 5) from front of connector shell (Figure 7, Item 1) using the proper contact removal tool.
 - f. Remove and discard failed contact (Figure 7, Item 5) from wire lead (Figure 7, Item 4).
 - g. Remove and discard seal (Figure 7, Item 3) (where applicable) from wire lead (Figure 7, Item 4).
 - h. Strip insulation from wire lead (Figure 7, Item 4) to the length of new contact wire well.
 - i. Install new seal (Figure 7, Item 3) onto wire lead (Figure 7, Item 4).
 - j. Crimp new contact (Figure 7, Item 5) to wire lead (Figure 7, Item 4) using proper crimping tool.
 - k. Test new contact (Figure 7, Item 5) using a multimeter to verify continuity is present using wire diagram as a guide to identify the correct circuit.
 - l. Grasp wire lead (Figure 7, Item 4) approximately 1.0 in (25 mm) behind new contact (Figure 7, Item 5).
 - m. Insert new contact (Figure 7, Item 5) straight into rear of connector shell (Figure 7, Item 1) until a click is felt.
 - n. Pull gently on wire lead (Figure 7, Item 4) to verify contact (Figure 7, Item 5) is locked into connector shell (Figure 7, Item 1).
 - o. Install connector lock (Figure 7, Item 2) into rear of connector shell (Figure 7, Item 1).
 - p. Install seal (Figure 7, Item 3) into connector lock (Figure 7, Item 2) until outer surface of seal (Figure 7, Item 3) is flush with outer surface of connector lock (Figure 7, Item 2).
 - q. Install repaired connector (Figure 7, Item 1) to electrical component.
 - r. Check electrical component for proper operation. Repair as required.

Table 5. Flat-Type Connector Repair.

WIRING HARNESS	ELECTRICAL COMPONENT (#)	CONTACT TYPE	NO. CONTACTS
Engine Wiring Harness	Battery Sensor (P5)	Pin	3
Engine Wiring Harness	Coolant Temperature Sensor (P35)	Pin	2

GENERAL MAINTENANCE – CONTINUED

Table 5. Flat-Type Connector Repair. – Continued

WIRING HARNESS	ELECTRICAL COMPONENT (#)	CONTACT TYPE	NO. CONTACTS
Engine Wiring Harness	Oil Pressure Sensor (P40)	Pin	3
Engine Wiring Harness	Cooling Fan (P96)	Pin	4
Engine Wiring Harness	Relay Panel (P5A) (black)	Pin	2
Engine Wiring Harness	Relay Panel (P5B) (gray)	Pin	6
Engine Wiring Harness	Relay Panel (P5C) (blue)	Pin	4
Engine Wiring Harness	Relay Panel (P5D) (green)	Pin	7
Power Wiring Harness	Relay Panel (P11) (black)	Pin	1
Power Wiring Harness	Relay Panel (P10) (gray)	Pin	1

7. Repair winterization kit connector (Table 6).

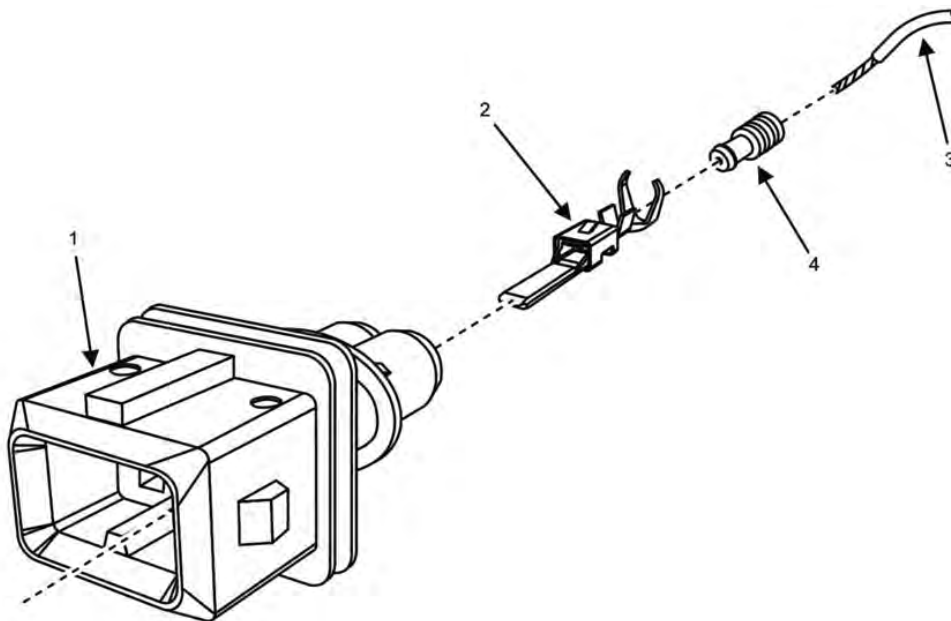


Figure 8. Winterization Kit Pin Connector.

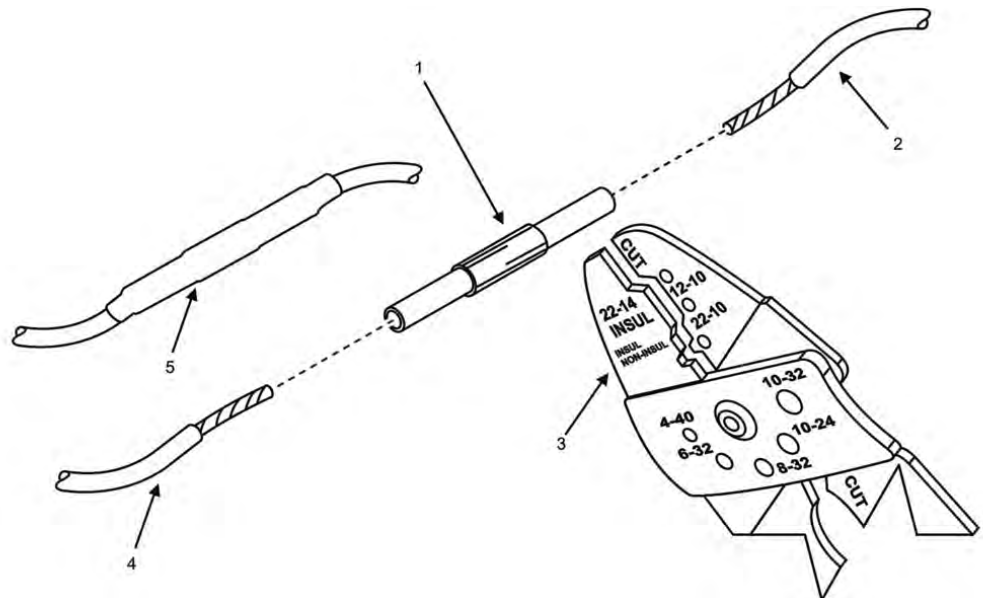
- Identify electrical connector containing failed contact.
- Disconnect wiring harness from electrical component.
- Test contacts of electrical connector using a multimeter to determine failed contact within the connector.
- Remove failed contact (Figure 8, Item 2) by inserting the extraction tool fully into the connector (Figure 8, Item 1) at the failed contact (Figure 8, Item 2). When the extraction tool reaches its full travel, the locking tabs on the failed contact (Figure 8, Item 2) are released.
- Pull wire lead (Figure 8, Item 3) connected to failed contact (Figure 8, Item 2) gently from the rear of connector (Figure 7, Item 1) to remove failed contact (Figure 8, Item 2).

GENERAL MAINTENANCE – CONTINUED

- f. Remove failed contact (Figure 8, Item 2) from wire lead (Figure 8, Item 3). Discard failed contact (Figure 8, Item 2).
- g. Slide seal (Figure 8, Item 4) further on wire lead (Figure 8, Item 3).
- h. Strip insulation from wire lead (Figure 8, Item 3) to the length of new contact wire well.
- i. Crimp new contact (Figure 8, Item 2) to wire lead (Figure 8, Item 3) using proper crimping tool.
- j. Test new contact (Figure 8, Item 2) using a multimeter to verify continuity is present using wire diagram as a guide to identify the correct circuit.
- k. Grasp wire lead (Figure 8, Item 3) approximately 1.0 in (25 mm) behind new contact (Figure 8, Item 2).
- l. Insert new contact (Figure 8, Item 2) and wire lead (Figure 8, Item 3) straight into rear of connector (Figure 8, Item 1) until a click is felt.
- m. Pull gently on wire lead (Figure 8, Item 3) to verify contact (Figure 8, Item 2) is locked into connector (Figure 8, Item 1).
- n. Install seal (Figure 8, Item 4) into connector (Figure 8, Item 1) until outer surface of seal (Figure 8, Item 4) is flush with outer surface of connector (Figure 8, Item 1).
- o. Install repaired connector (Figure 8, Item 1) to electrical component.
- p. Check electrical component for proper operation. Repair as required.

Table 6. Winterization Kit Connector Repair.

ELECTRICAL COMPONENT (#)	CONTACT TYPE	NO. CONTACTS
Winterization Kit - Fuel Metering Pump (P21)	Pin	2

**Figure 9. Butt Connector.**

GENERAL MAINTENANCE – CONTINUED**NOTE**

Butt connectors are installed to repair (splice) in-line damage to an electrical wire. If damage to wire is longer than a replacement butt connector, use two butt connectors and a length of appropriate replacement wire to make a splice repair.

8. Install butt connector.
 - a. Locate in-line damage to electrical wire and determine size of wire and butt connector required.
 - b. Remove and discard damaged section of wire from wiring harness.
 - c. Remove the insulation from each end of the original wiring harness ends (Figure 9, Items 2 and 4).
 - d. Cut a piece of shrink wrap (Figure 9, Item 5) 1.0 in (25 mm) longer than the butt connector (Figure 9, Item 1) being used for the repair.
 - e. Slide shrink wrap (Figure 9, Item 5) over one end of the original wiring harness ends (Figure 9, Items 2 or 4).
 - f. Crimp both ends of original wiring harness (Figure 9, Items 2 and 4) into butt connector (Figure 9, Item 1) using a wire crimping tool (Figure 9, Item 3).
 - g. Slide shrink wrap (Figure 9, Item 5) over the installed butt connector (Figure 9, Item 1). Be sure entire butt connector (Figure 9, Item 1) is covered and shrink wrap (Figure 9, Item 5) is overlapping original wiring harness ends (Figure 9, Items 2 and 4).
 - h. Heat shrink wrap (Figure 9, Item 5) until it has tightly covered butt connector (Figure 9, Item 1).
 - i. Check electrical component for proper operation. Repair as required.

END OF TASK**Installing InPower AMMPS to a Compatible PC**

1. Ensure compatible PC meets the following requirements:
 - a. Windows 2000, Windows XP, Windows Vista, or Windows 7 32-bit operating system. Installer will detect an unsupported system and abort the installation.
 - b. Internet Explorer 5.5 or above installed and running on the system. Installation cannot proceed if the Internet Explorer version is less than 5.5.
 - c. .Net Framework 2.0 or above for certain utilities and programs to work. Utilities will not work if version 2.0 or above is not available on the system, but installation will proceed.
 - d. A user login and administrative rights on compatible PC for installation. On Windows 7 and Vista operating systems, installation will fail without administrative rights. See administrator for administrative rights if installation fails.
 - e. Any previous version of InPower AMMPS removed from compatible PC IAW standard uninstall procedure.

NOTE

A CD with InPower AMMPS software is issued with each generator set. When using Windows 2000, the V2.0 InPower AMMPS CD folder must be manually opened from [My Computer]. When using Windows XP, the [Open folder to view files using Windows Explorer] option must be chosen from a dialog box that automatically displays. Windows Vista and 7 will automatically run the setup.exe without any prompt.

2. Run setup for InPower AMMPS V2.0.

GENERAL MAINTENANCE – CONTINUED**CAUTION**

Default path setting must be used as the destination folder. Restrictions are on a few folders for some operating systems. If restricted paths are selected, select an alternative path. Failure to comply may cause damage to equipment.

NOTE

Installer will check all prerequisites to perform installation. If any prerequisite is not met, then installer will inform user. If entire prerequisite is available, tool will check for previous versions of InPower AMMPS. Installer will not install InPower AMMPS if the same version or a newer version of InPower AMMPS is already installed on the PC.

3. Click [Next] and ensure Steps 1a through 1e conditions are met if an item is not checked during prerequisite check.

NOTE

Read each screen before making selection.

4. Make selections and click [Next] on the next four screens to install InPower AMMPS at default settings onto PC.

NOTE

Installer may run for several minutes depending on PC performance.

5. Select [Next] to finish installation and view [ReadMe] file.
6. Select [Next] once finished viewing [ReadMe] file.
7. Select [Finish] once setup has completed successfully.
8. Select and open InPower AMMPS icon from desktop or start menu to confirm proper operation.

END OF TASK**Using InPower AMMPS on a Compatible PC****NOTE**

Figure 10 shows a remote cable (Figure 10, Item 4) and a local cable (Figure 10, Item 5). Both cables utilize a RS-485 to RS-232 converter (Figure 10, Item 6). The RS-485 side of the converter plugs into the cable. The RS-232 side plugs into the compatible PC COM Port 1.

NOTE

The remote cable (Figure 10, Item 4) supports both remote operating software and InPower AMMPS use. The local cable (Figure 10, Item 5) with DISPLAY (Figure 10, Item 8) and MAIN (Figure 10, Item 7) adapters must be used when performing initial or update calibration functions and downloading log files with InPower AMMPS.

GENERAL MAINTENANCE – CONTINUED

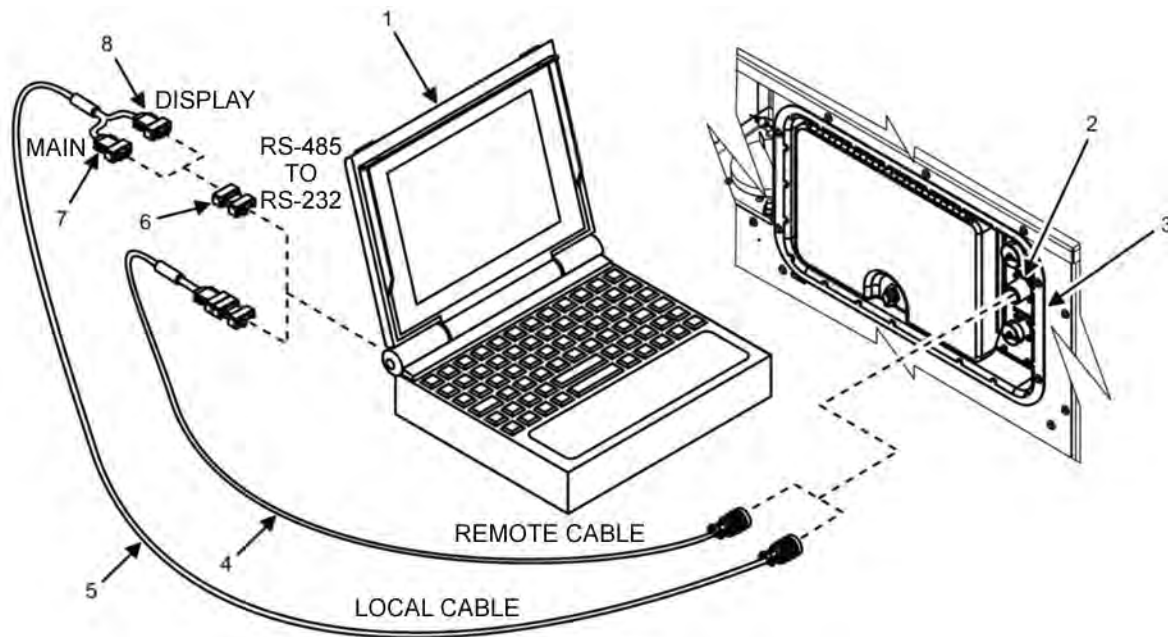


Figure 10. PC and DCS Connections.

1. Install battery ground cable (WP 0036, Remove/Install Batteries) and ensure battery power is supplied to the DCS (main DC circuit breaker ON (TM 9-6115-749-10)).

NOTE

DCS screen will activate upon connection of remote or local cable (Figure 10, Items 4 and 5).

2. Connect a remote cable (Figure 10, Item 4) or local cable (Figure 10, Item 5) to the DCS (Figure 10, Item 3) at REMOTE port (Figure 10, Item 2) and to a compatible PC (Figure 10, Item 1) using MAIN (Figure 10, Item 7) adapter and RS-485 to RS-232 converter (Figure 10, Item 6).
3. Select and open InPower AMMPS icon from desktop or start menu. Install if necessary. See Installing InPower AMMPS to a Compatible PC task.

GENERAL MAINTENANCE – CONTINUED

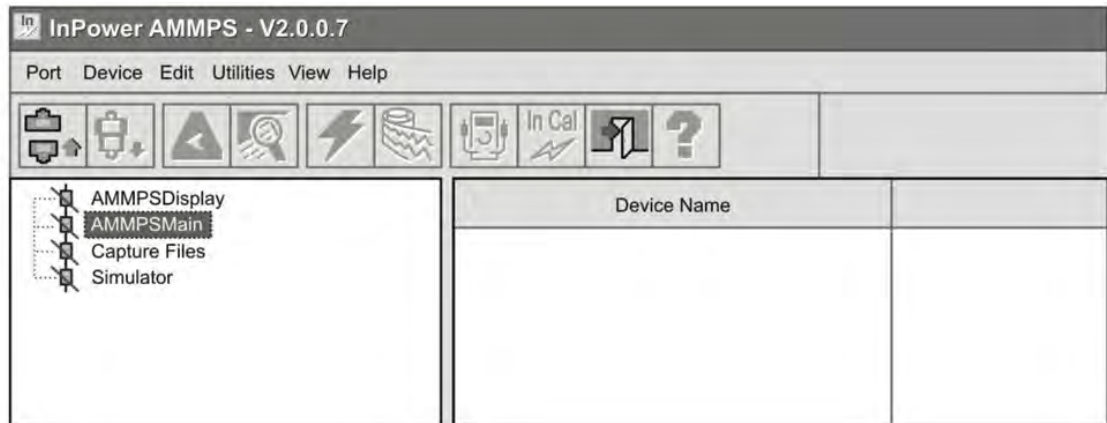


Figure 11. AMMPS Main.

4. Select [AMMPSMain] from left-side explorer pane (Figure 11).

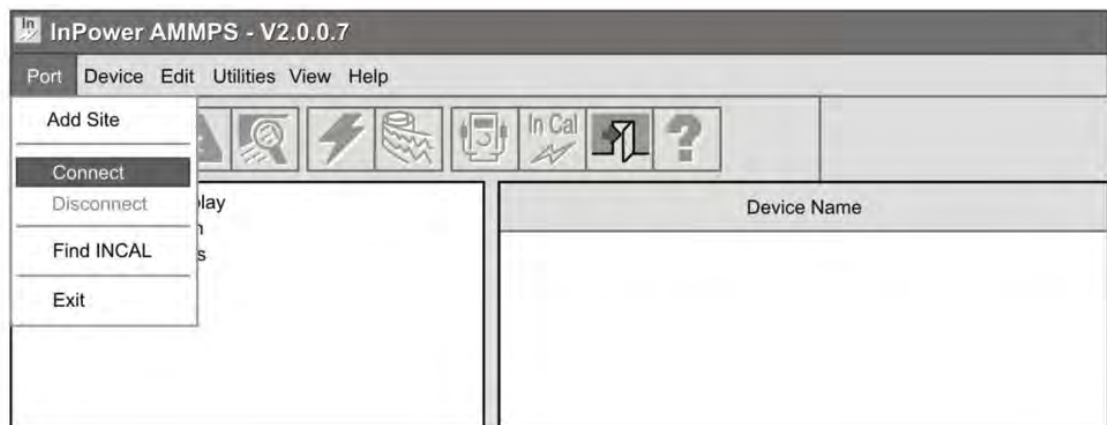


Figure 12. Port Connect.

5. Right-click on [AMMPSMain] or select [Port] from menu bar (Figure 12).
6. Select [Connect] from drop-down menu (Figure 12).
7. Check the following if InPower AMMPS fails to connect:
 - a. Ensure COM port for [AMMPSDisplay] or [AMMPSMain] is correct and not being used by another device or program. Access [Add Site] from [Port] drop-down menu to change COM port or add a different COM port site.
 - b. Ensure proper RS-485 adapter is being utilized and is installed correctly (Figure 10).
 - c. Ensure battery power is supplied to DCS and DCS is powered on (Step 1).
 - d. Check all cables for proper installation and connections (Step 2).

GENERAL MAINTENANCE – CONTINUED

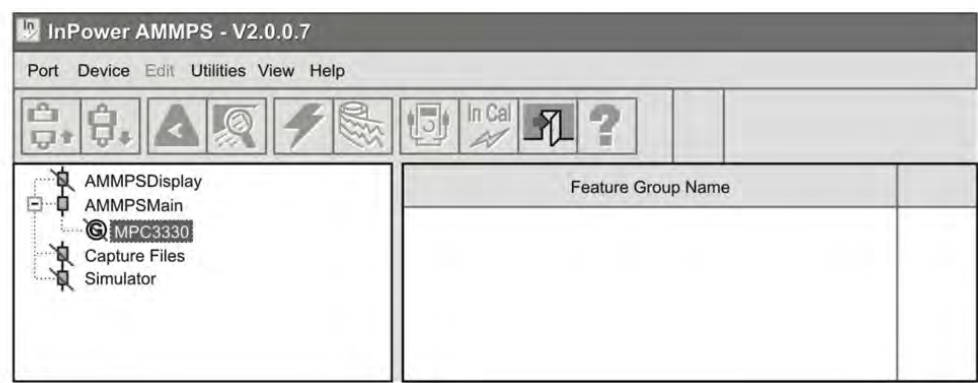


Figure 13. Device MPC3330.

- 8. Select device [MPC3330] once connected to [AMMPSMain] (Figure 13).

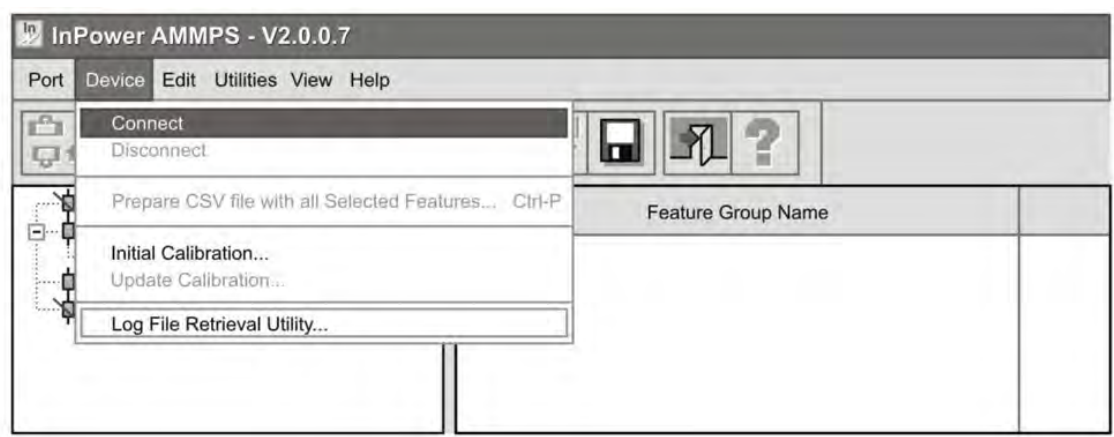


Figure 14. Device Connect.

- 9. Right-click on [MPC3330] or select [Device] from menu bar (Figure 14).
- 10. Select [Connect] from drop-down menu (Figure 14).

GENERAL MAINTENANCE – CONTINUED

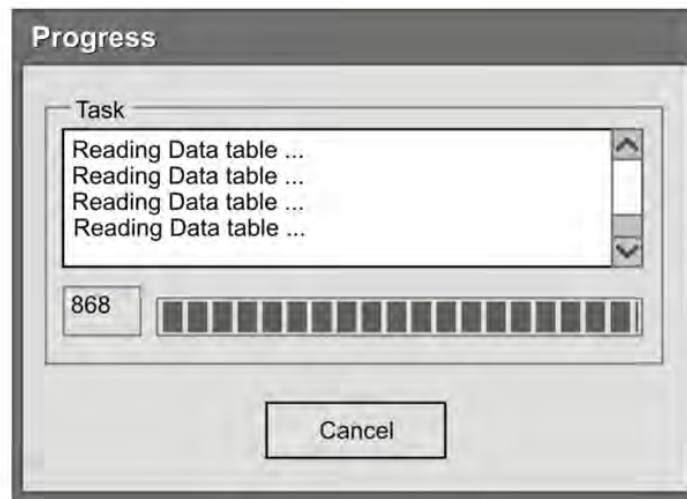


Figure 15. Data Table.

NOTE

Depending on performance of computer, DCS data may take several minutes to load.

11. View [Progress] dialog box as InPower AMMPS imports data from DCS (Figure 15).

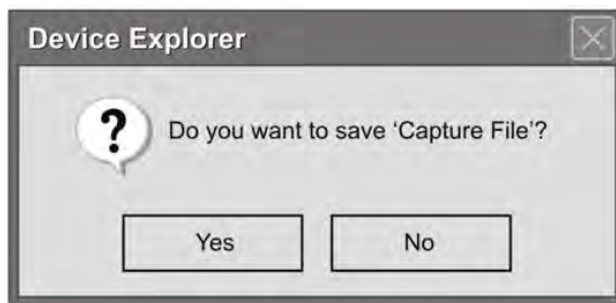


Figure 16. Capture File Yes or No.

NOTE

A capture file is required to perform Using a Capture File to Overlay Data task. Default location for capture file is shown in Figure 17.

12. Perform one of the following when dialog box displays (Figure 16):
 - a. Select [Yes] to save a capture file and:
 - (1) Use default name and default location (Figure 17).

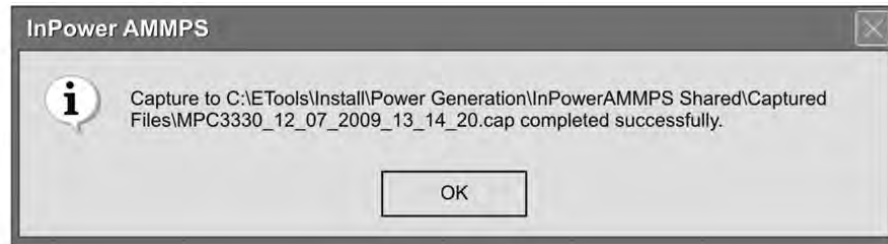
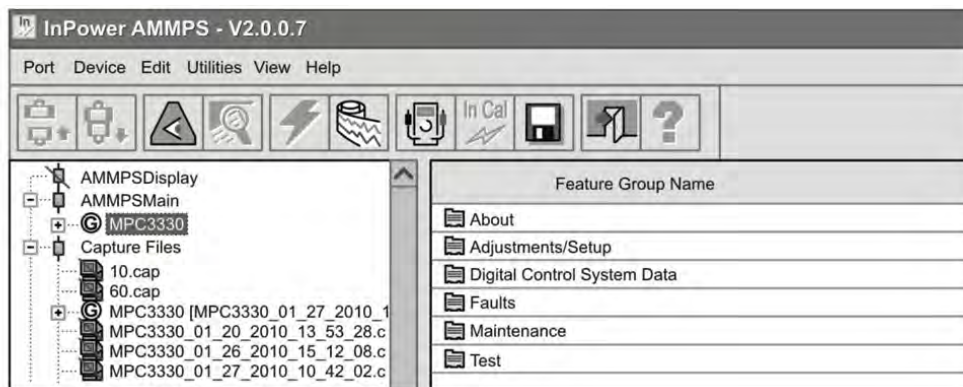
NOTE

A progress bar will show the save process.

- (2) Select [Save].

GENERAL MAINTENANCE – CONTINUED

- (3) Select [OK] once InPower AMMPS captures file successfully (Figure 17).
- b. [No] if capture file will not be saved.

**Figure 17. Capture File.****Figure 18. InPower AMMPS Maintenance.**

13. Use InPower AMMPS for maintenance or troubleshooting as required (Figure 18).

END OF TASK**Downloading Log Files from DCS****NOTE**

Log File Retrieval Utility can be accessed only after connecting to [AMMPSDisplay] device through InPower AMMPS.

1. Ensure battery ground cable is installed (WP 0036, Remove/Install Batteries) and ensure battery power is supplied to the DCS (main DC circuit breaker ON (TM 9-6115-749-10)).

NOTE

Figure 10 shows a remote cable (Figure 10, Item 4) and a local cable (Figure 10, Item 5). Both cables utilize a RS-485 to RS-232 converter (Figure 10, Item 6). The RS-485 side of the converter plugs into the cable. The RS-232 side plugs into the compatible PC COM Port 1. DISPLAY (Figure 10, Item 8) adapter will be used for Step 2.

2. Connect a local cable (Figure 10, Item 5) (with DISPLAY (Figure 10, Item 8) adapter) to the DCS (Figure 10, Item 3) and a compatible PC (Figure 10, Item 1).

GENERAL MAINTENANCE – CONTINUED

NOTE

DCS screen will activate upon connection of cable.

3. Select and open InPower AMMPS icon from desktop or start menu. Install if necessary. See Installing InPower AMMPS to a Compatible PC task.
4. Select [AMMPSDisplay] from left-side explorer pane (Figure 19).
5. Double-click on [AMMPSDisplay] (Figure 19) or select [Connect] from [Port] drop-down menu (Figure 20).



Figure 19. AMMPS Display.

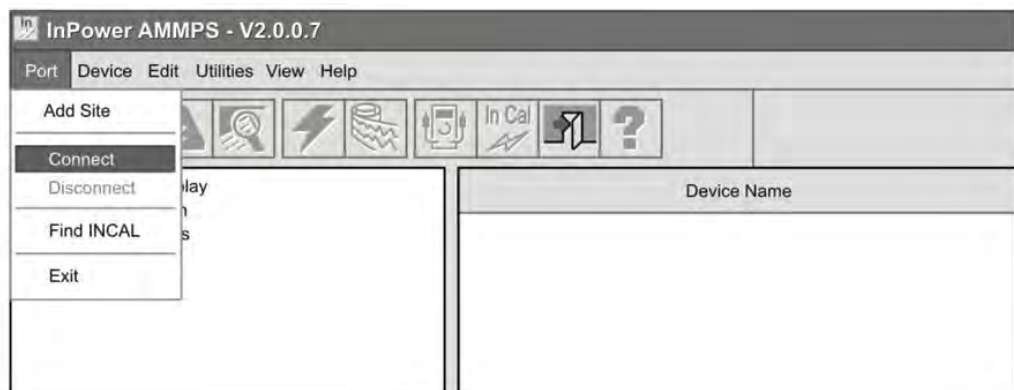


Figure 20. Port Connect for AMMPS Display.

6. Check the following if InPower fails to connect:
 - a. Ensure COM port for [AMMPSDisplay] is correct and not being used by another device or program. Access [Add Site] from [Port] drop-down menu to change COM port or add a different COM port site.
 - b. Ensure proper RS-485 adapter is being utilized and is installed correctly (Figure 10).
 - c. Ensure battery power is supplied to DCS and DCS is on (Step 1).
 - d. Check all cables for proper installation and connections (Step 2).

GENERAL MAINTENANCE – CONTINUED

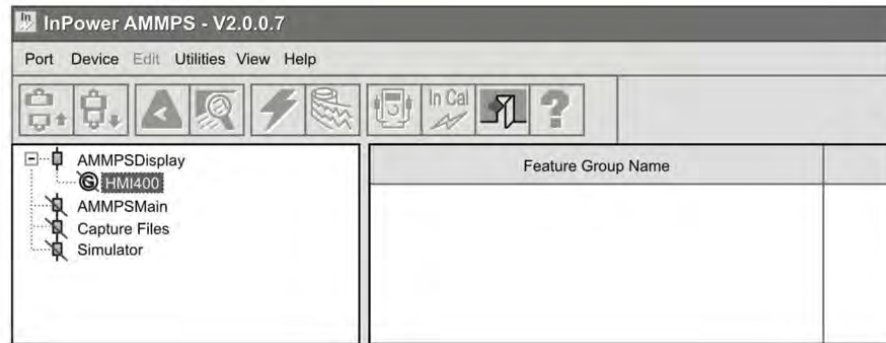


Figure 21. Device HMI400.

7. Select [HMI400] from left-side explorer pane (Figure 21).
8. Select [Connect] from [Device] drop-down menu (Figure 22).

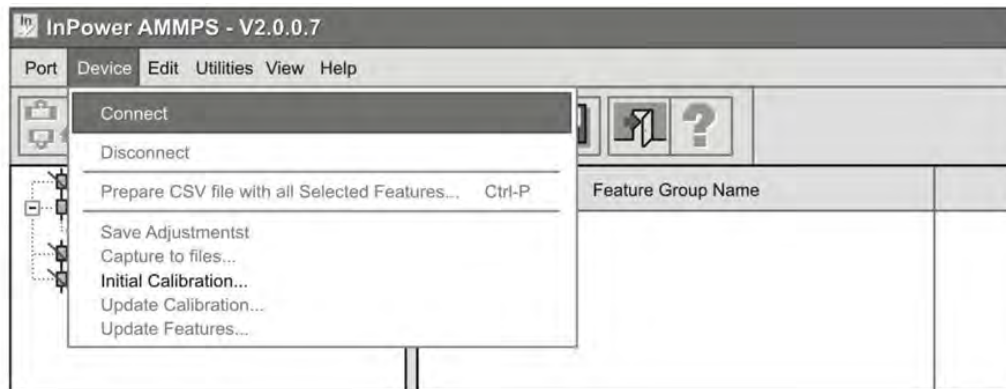


Figure 22. Device Connect for AMMPS Display.

GENERAL MAINTENANCE – CONTINUED

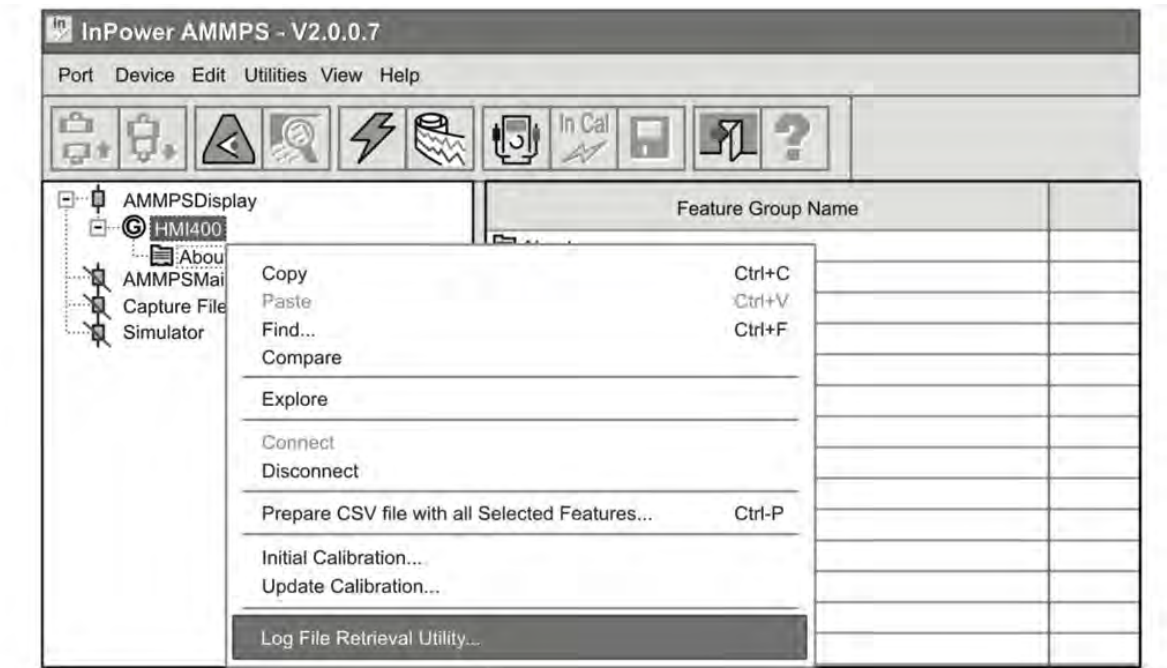


Figure 23. Log File Retrieval Utility.

NOTE

Log File Retrieval Utility can also be accessed through [Device] on menu bar.

- 9. Right-click [HMI400] from left-side explorer pane once connected (Figure 23) and select [Log File Retrieval Utility] to access dialog box (Figure 24).

GENERAL MAINTENANCE – CONTINUED

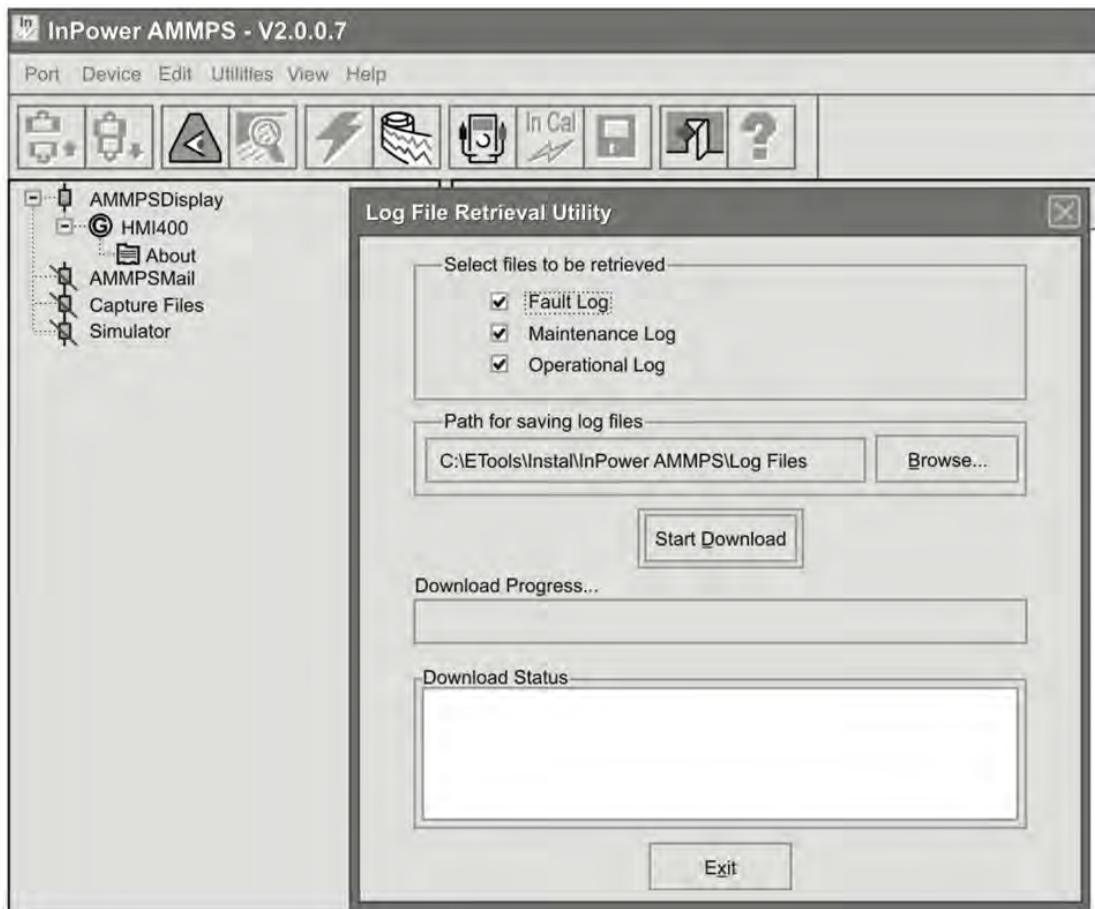


Figure 24. Log File Retrieval Utility Dialog Box.

10. Select/de-select any of the log files (Figure 24) for retrieval:
 - a. [Fault Log].
 - b. [Maintenance Log].
 - c. [Operational Log].

NOTE

Default path for saving log files is C:\ETools\Instal\InPower AMMPS\Log Files.

11. Use [Browse] button (Figure 24) to change save location for log(s), if different location is desired.

GENERAL MAINTENANCE – CONTINUED

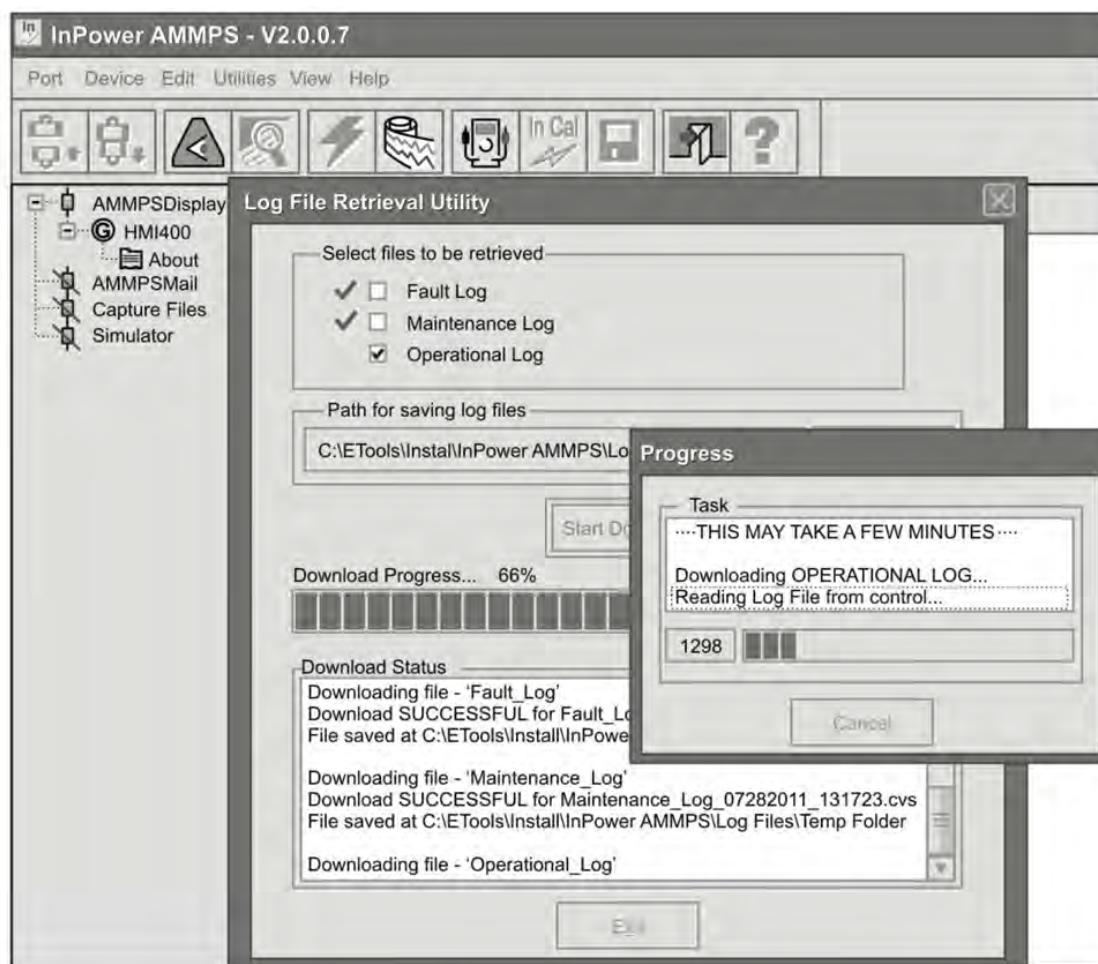


Figure 25. Log File Retrieval Utility Download.

NOTE

Download time (Figure 25) will vary depending on the size of the files within the control and the connection speed (baud rate).

12. Click [Start Download] button (Figure 24).

GENERAL MAINTENANCE – CONTINUED

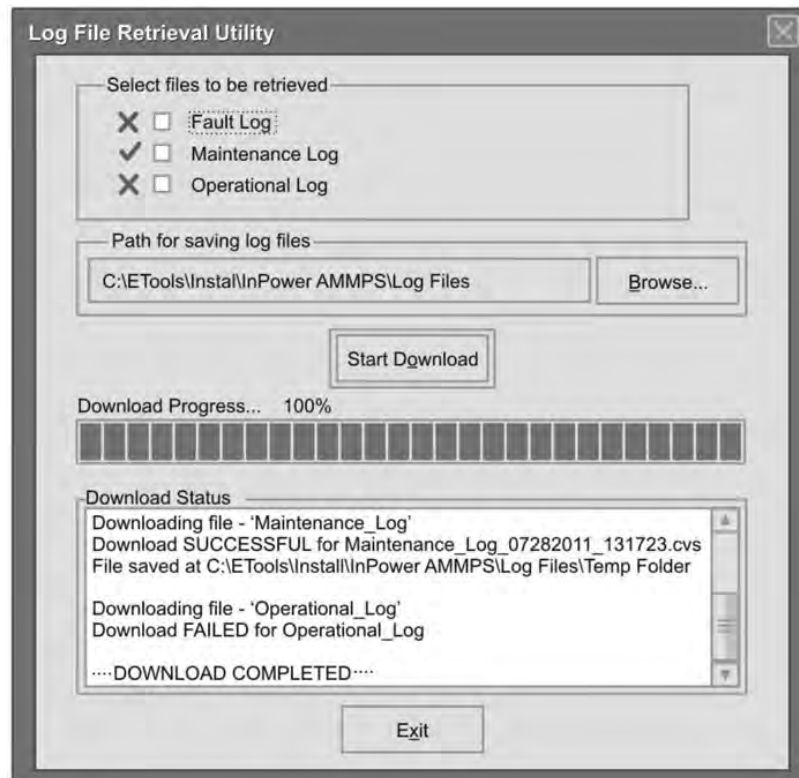


Figure 26. Log File Retrieval Utility Download Status.

NOTE

A green check mark (Figure 26) will appear next to the selected file(s) once file(s) is downloaded successfully. A red cross next to file(s) and indication DOWNLOAD FAILED in [Download Status] will appear for any file that fails to download. Figure 26 shows successful [Maintenance Log] download, failed [Fault Log] download, and failed [Operational Log] download.

13. Check [Download Status] message box (Figure 26) to ensure logs download properly.
14. Start a new download or click [Exit] (Figure 26) when all desired downloads are complete.

NOTE

Log files are Comma-Separated Values (CSV) files. A compatible program, such as Microsoft Excel, is required for viewing. Files can be copied and renamed onto a desktop without opening and viewing.

15. Open selected log from default path or saved location and review data in file.
16. Remove local cable (Figure 10, Item 5) (with DISPLAY (Figure 10, Item 8) adapter) from the DCS (Figure 10, Item 3) and compatible PC (Figure 10, Item 1).

END OF TASK

GENERAL MAINTENANCE – CONTINUED**Using a Capture File to Overlay Data****CAUTION**

It is important to save the latest capture file from DCS being replaced. Data can only be accessed using InPower AMMPS and a MSD hard drive (or compatible computer). If data is accessible, capture file can be used to overlay parameters and maintenance timers from the replaced DCS. If unable to access capture file data, maintenance timers will be reset and some parameters from replaced DCS will be lost. Use latest hard copy records to determine when maintenance actions are due. Failure to comply will cause damage to equipment.

CAUTION

It is important to save log data from DCS being replaced. The maintenance, operational, and fault logs should be downloaded from the DCS with InPower and saved to the hard drive of a MSD (or compatible computer). Maintenance, operational, and fault logs cannot be uploaded to the new DCS, but can be saved for reference. All logs will start over with a new DCS. If unable to access logs, use latest hard copy records to access operational, maintenance, and fault events. Failure to comply may cause damage to equipment.

NOTE

DCS that contains desired data will be referred to as DCS 1. DCS 2 is the destination DCS. DCS 2 can either be the same DCS after a calibration has been completed or a new DCS that is replacing a failed DCS.

NOTE

Capture files can be stored in the [Captured Files] folder on the hard drive of a PC. They can also be removed and placed in an easy access location such as a desktop, CD, or memory drive. If a different PC will be used to upload capture file to DCS 2, capture file must be copied and pasted to PC that will be used.

1. Connect to [AMMPSMain] of DCS 1 and ensure capture file is saved. See Using InPower AMMPS on a Compatible PC task.
2. Use explorer pane of PC to access [C:\ETools\Install\Power Generation\InPowerAMMPS Shared\Captured Files] on the computer hard drive.

NOTE

Capture files can be renamed and stored in the [Captured Files] folder on the hard drive of a PC. They can also be removed and placed in an easy access location such as a desktop, CD, or memory drive. If a different PC will be used to upload capture file to DCS 2, capture file must be copied and pasted to PC that will be used.

3. Copy and paste desired (most recent) capture file to selected location and rename as DCS 1 or rename capture file as DCS 1 and leave in current location.
4. Disconnect InPower AMMPS from DCS.
5. Record engine hours of DCS 1 and save for use with DCS 2.
6. Disconnect from [AMMPSMain] and remove local cable (Figure 10, Item 5) (with MAIN (Figure 10, Item 7) adapter).
7. Paste capture file from DCS 1 into [C:\ETools\Install\Power Generation\InPowerAMMPS Shared\Captured Files] on the PC hard drive if moving capture file from one PC or location to another.
8. Connect to [AMMPSMain] of DCS 2. See Using InPower AMMPS on a Compatible PC task.

GENERAL MAINTENANCE – CONTINUED

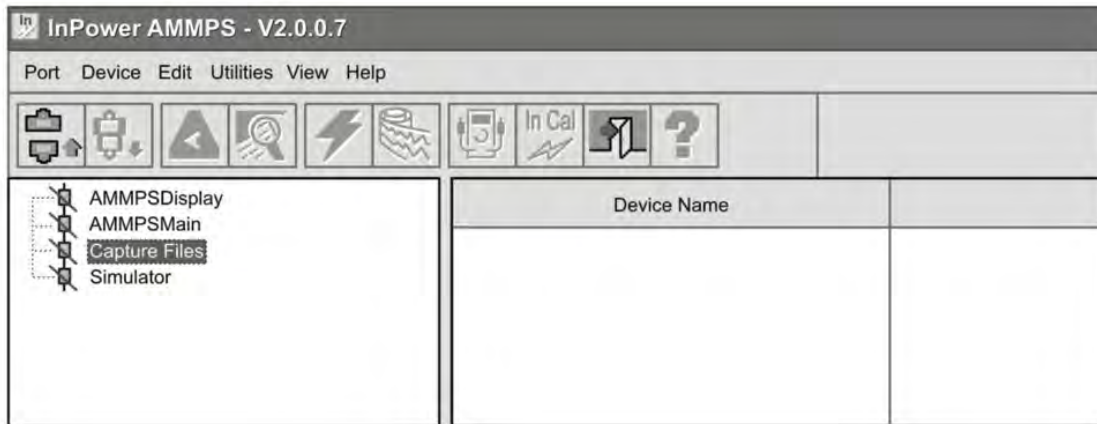


Figure 27. Capture File Explorer.

9. Select [Capture Files] from explorer pane (Figure 27).

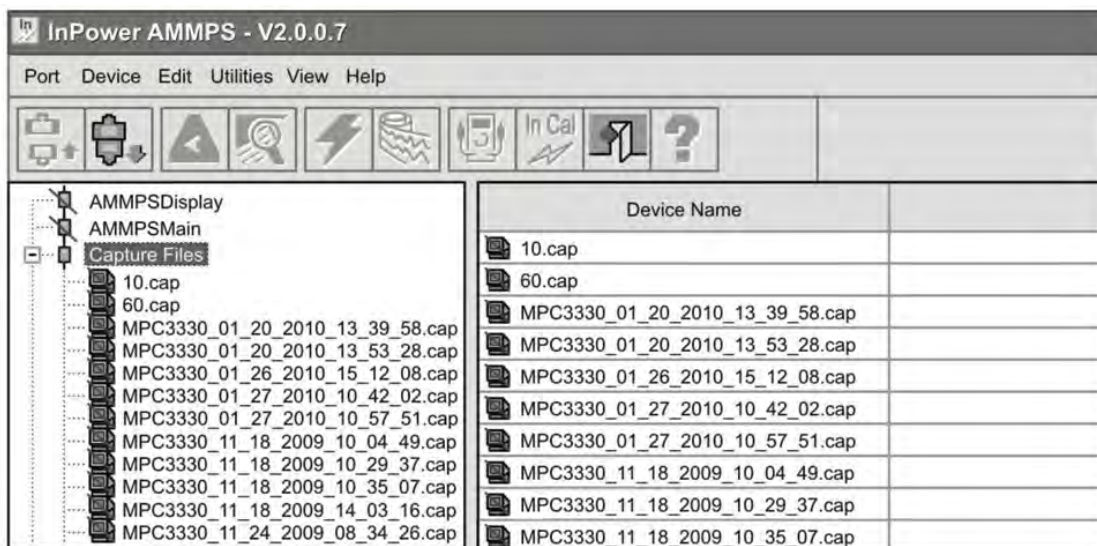


Figure 28. Open Capture Files Explorer.

10. Double-click on [Capture Files] to display available [Capture Files] (Figure 28).

GENERAL MAINTENANCE – CONTINUED

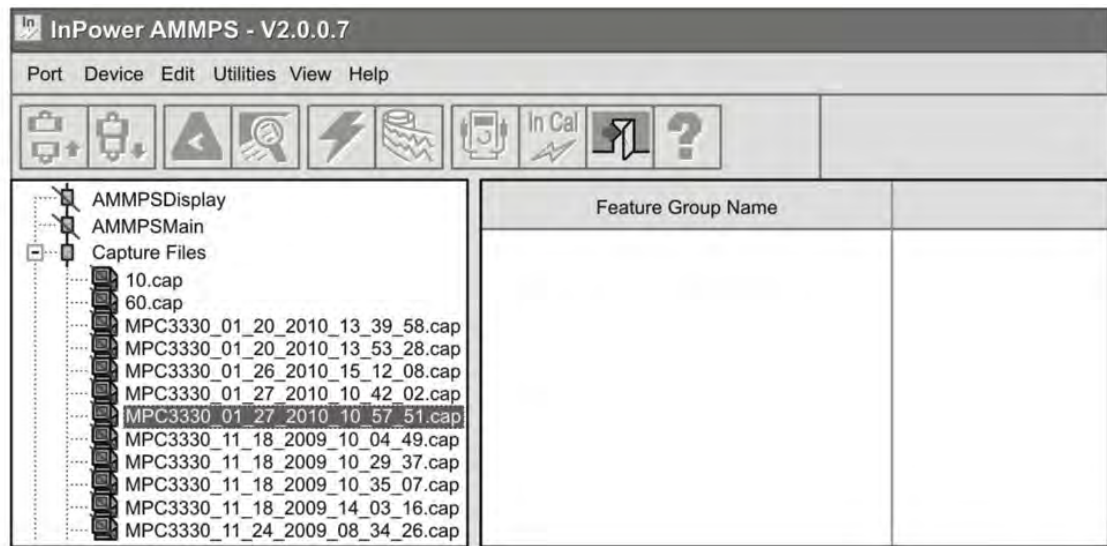


Figure 29. Select Capture File.

NOTE

Selected capture file shown in Figure 29 is an example. Any desired capture file can be selected and used as long as data required has been captured in file.

11. Select desired capture file from DCS 1 based on latest data captured or pasted to file (Figure 29).
12. Double-click selected capture file to connect and display capture file (Figure 29).

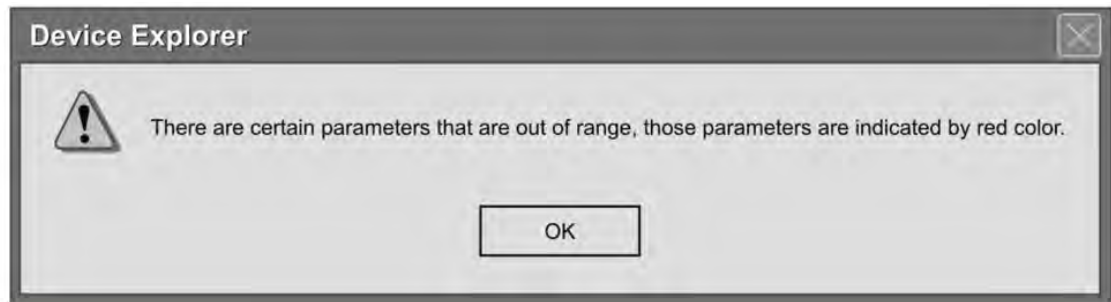


Figure 30. Parameters Dialog Box.

13. Choose [OK] when dialog box displays (Figure 30).

GENERAL MAINTENANCE – CONTINUED



Figure 31. Parameters Missing.

NOTE

A dialog box indicating missing parameters (Figure 31) may display due to missing information (such as a model number) or a problem with the capture file. Depending on the condition of DCS 1, some data may not have been copied to capture file. Continue to overlay available data. Remaining data can be entered as required. See Step 19.

14. Choose [OK] if second dialog box displays (Figure 31).
15. Connect InPower AMMPS to [AMMPSMain] and [MPC3330] of DCS 2. See Using InPower AMMPS on a Compatible PC task.

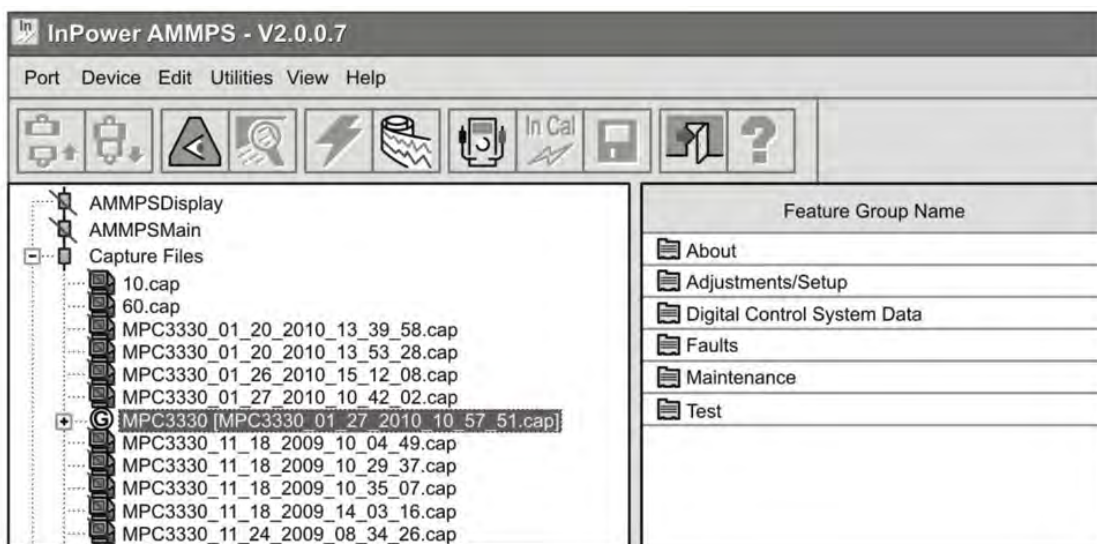


Figure 32. Drag Capture File.

GENERAL MAINTENANCE – CONTINUED**NOTE**

Before drag and drop, ensure InPower AMMPS is connected to [AMMPS Main] and [MPC3330] of DCS 2. Once selected, drag capture file from current location and drop to [AMMPSMain] to overlay file.

16. Select capture file (Figure 32) with mouse pointer and holddown left mouse button to drag and drop capture file to [AMMPSMain] device (Figure 33).

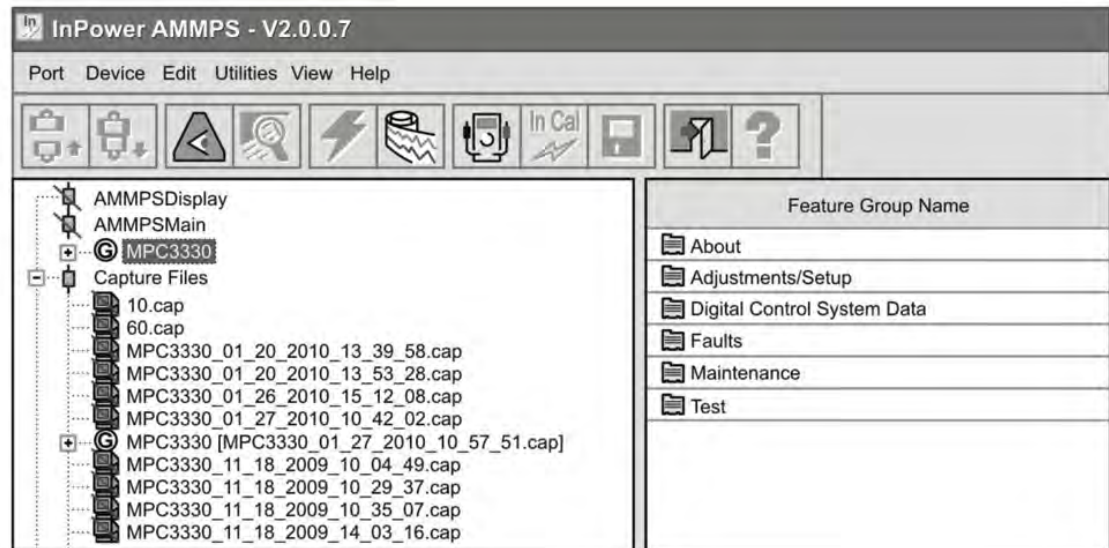


Figure 33. Drop Capture File.

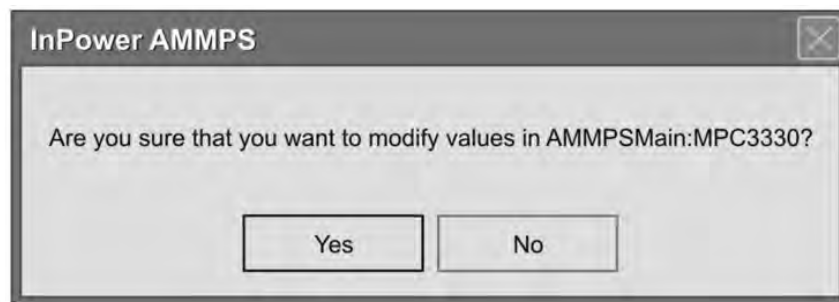


Figure 34. Modify Values.

17. Choose [Yes] when dialog box displays (Figure 34).

GENERAL MAINTENANCE – CONTINUED



Figure 35. Save Adjustments.

18. Choose [OK] when dialog box displays (Figure 35).

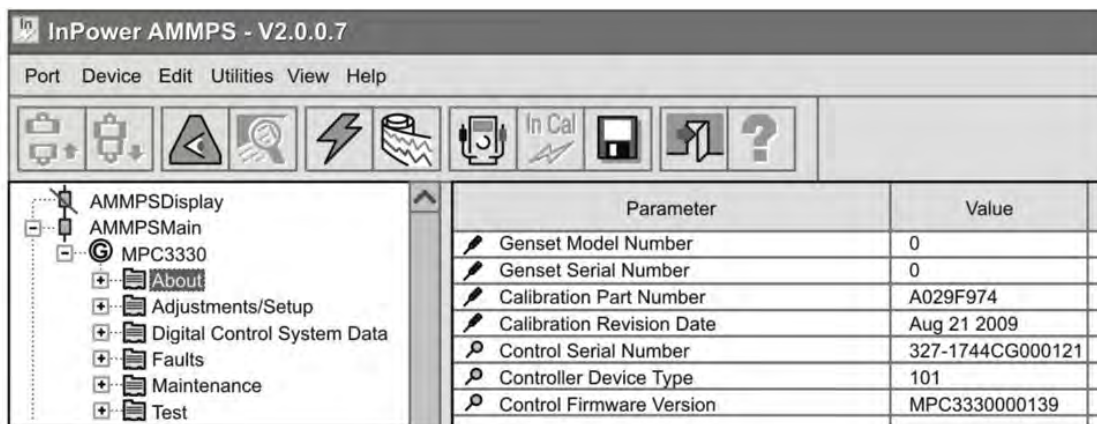
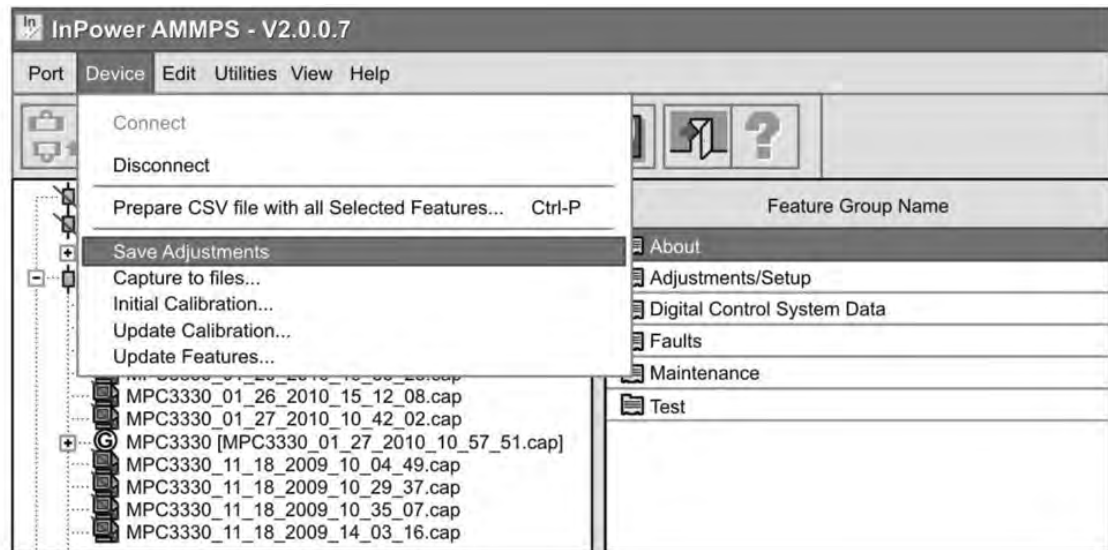


Figure 36. About Parameters.

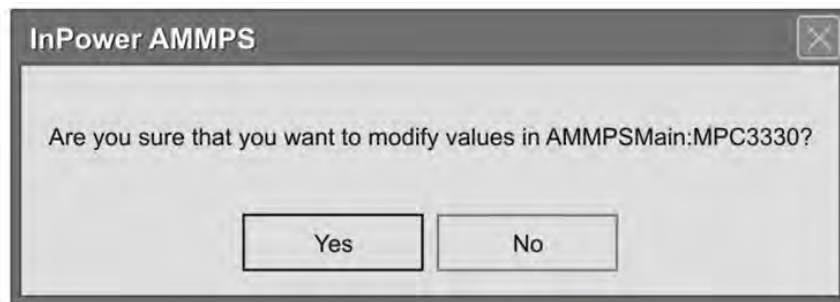
NOTE

[About] is shown in Figure 36 as an example of an option available from the explorer pane. [Adjustments/Setup], [Digital Control System Data], [Faults], [Maintenance], and [Test] are also all available for viewing. Adjustments to the parameters are only required when a value is missing or a value is desired that currently is not saved to a parameter.

19. Select an option (e.g. [About]) from explorer pane under [MPC3330] device and modify parameters as required by double-clicking within [Value] and typing desired text (e.g. add model number to [Value] column of [Genset Model Number] Parameter) (Figure 36).

GENERAL MAINTENANCE – CONTINUED**Figure 37. Save Adjustments from Drop-Down Menu.**

20. Select [Save Adjustments] from [Device] drop-down menu (Figure 37) or select save icon shortcut (not shown).

**Figure 38. Confirm Modify Values.**

21. Select [Yes] when dialog box displays (Figure 38).

GENERAL MAINTENANCE – CONTINUED

Save Adjustments

Site ID: AMMPMain Device Name: MPC3330

Following parameter values have been changed. Do you want to permanently save the changes you have made?

Parameter Description	Old Value	New Value
Maintenance Item 5004 Countdown	700.20	750.06
Maintenance Item 5001 Countdown	0.15	250.02
Maintenance Item 5007 Countdown	1950.30	2000.16
Genset 3 Phase 400Hz Voltage Calibration	0.999	0.992
Calibration Revision Date	Nov 4 2009	Aug 21 2009
Maintenance Item 5017 Countdown	200.16	250.02
Maintenance Item 5014 Countdown	5.18	24.00
Maintenance Item 5011 Countdown	5.18	24.00
Maintenance Item 5006 Countdown	700.20	750.06
Maintenance Item 5003 Countdown	700.20	750.06
Genset 3 Phase 50/60Hz Voltage Calibration	0.996	0.988
Maintenance Item 5009 Countdown	450.18	500.04
Genset 240V Single Phase 50/60Hz Voltage Calibration	1.000	0.985
Genset 120V Single Phase 400Hz Voltage Calibration	1.001	0.978
Maintenance Item 5010 Countdown	1450.26	1500.12
Maintenance Item 5016 Countdown	200.16	250.02
Maintenance Item 5013 Countdown	2450.34	2500.20
Maintenance Item 5002 Countdown	700.20	750.06
Maintenance Item 5008 Countdown	1450.26	1500.12
Maintenance Item 5005 Countdown	1950.30	2000.16
Genset 120V Single Phase 50/60Hz Voltage Calibration	0.996	0.972
Genset 240V Single Phase 400Hz Voltage Calibration	1.005	0.991
Maintenance Item 5012 Countdown	4950.54	5000.40

Save Discard Cancel

Figure 39. Confirm Save Adjustments.

22. Review [Save Adjustments] dialog box for changes between [Old Value] column and [New Value] column (Figure 39).
23. Confirm parameters are the correct or desired changes for DCS 2 (Figure 39).
24. Compare hard copy records as required.
25. Double-click [New Value] column as required to adjust parameter values and click [Save] once adjustments are made (Figure 39).

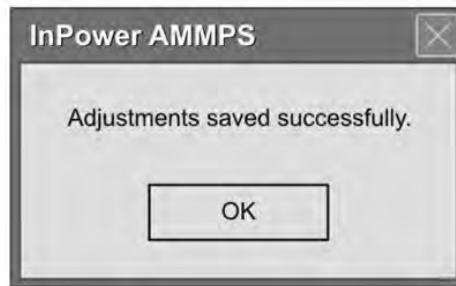
GENERAL MAINTENANCE – CONTINUED

Figure 40. Saved.

26. Select [OK] when [Adjustments saved successfully] displays in dialog box (Figure 40).
27. Retry capture file procedure if adjustments are not saved successfully. See Steps 1 through 26.
28. Update engine hours using adjustments screen 2 based on recorded value from DCS 1 (TM 9-6115-749-10).
29. Turn main DC circuit breaker OFF (TM 9-6115-749-10).
30. Turn main DC circuit breaker ON (TM 9-6115-749-10).
31. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
32. Start engine and check for proper operation (TM 9-6115-749-10).
33. Repair as required.

END OF TASK

Using Initial Calibration to Install Control Firmware Updates

1. Install battery ground cable (WP 0036, Remove/Install Batteries) and ensure battery power is supplied to the DCS (main DC circuit breaker ON (TM 9-6115-749-10)).

NOTE

Figure 10 shows a remote cable (Figure 10, Item 4) and a local cable (Figure 10, Item 5). Both cables utilize a RS-485 to RS-232 converter (Figure 10, Item 6). The RS-485 side of the converter plugs into the cable. The RS-232 side plugs into the compatible PC COM Port 1. MAIN (Figure 10, Item 7) adapter will be used for Step 2.

2. Connect a local cable (Figure 10, Item 5) (with MAIN (Figure 10, Item 7) adapter) to the DCS (Figure 10, Item 3) and a compatible PC (Figure 10, Item 1).

NOTE

DCS screen will activate upon connection of cable.

3. Select and open InPower AMMPS icon from desktop or start menu. Install if necessary. See Installing InPower AMMPS to a Compatible PC task.

NOTE

[Initial Calibration] feature is used to download a new firmware version calibration file into a replacement or current DCS.

4. Connect to [AMMPSMain]. See Using InPower AMMPS on a Compatible PC task.

GENERAL MAINTENANCE – CONTINUED

5. Mark or save a capture file as required. See Using a Capture File to Overlay Data task.

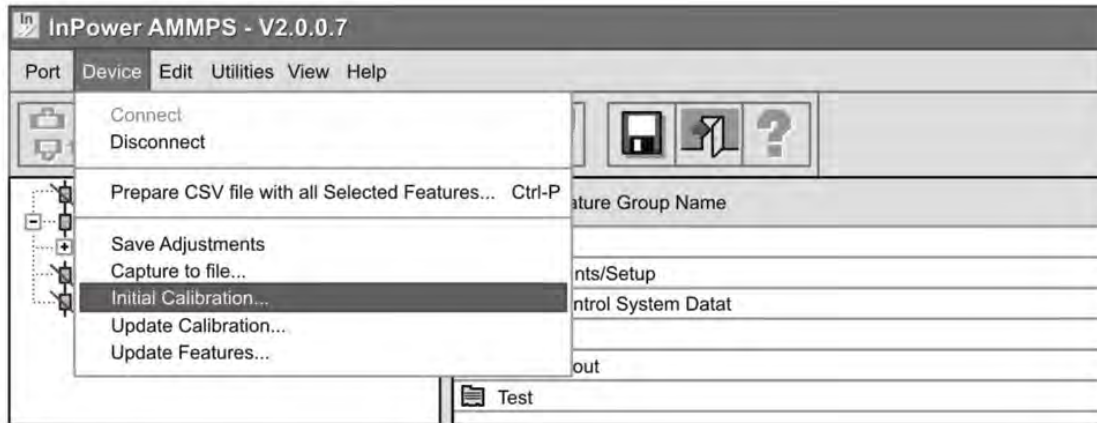


Figure 41. Initial Calibration.

CAUTION

Calibration steps must be followed in order presented. Failure to comply may cause damage to equipment.

NOTE

If a dialog box indicates that there is an error loading, the drive letter may not have been correctly specified during InPower AMMPS installation. The correct drive designation may need to be specified as required.

6. Click on the [Device] drop-down menu and select [Initial Calibration] (Figure 41).

GENERAL MAINTENANCE – CONTINUED

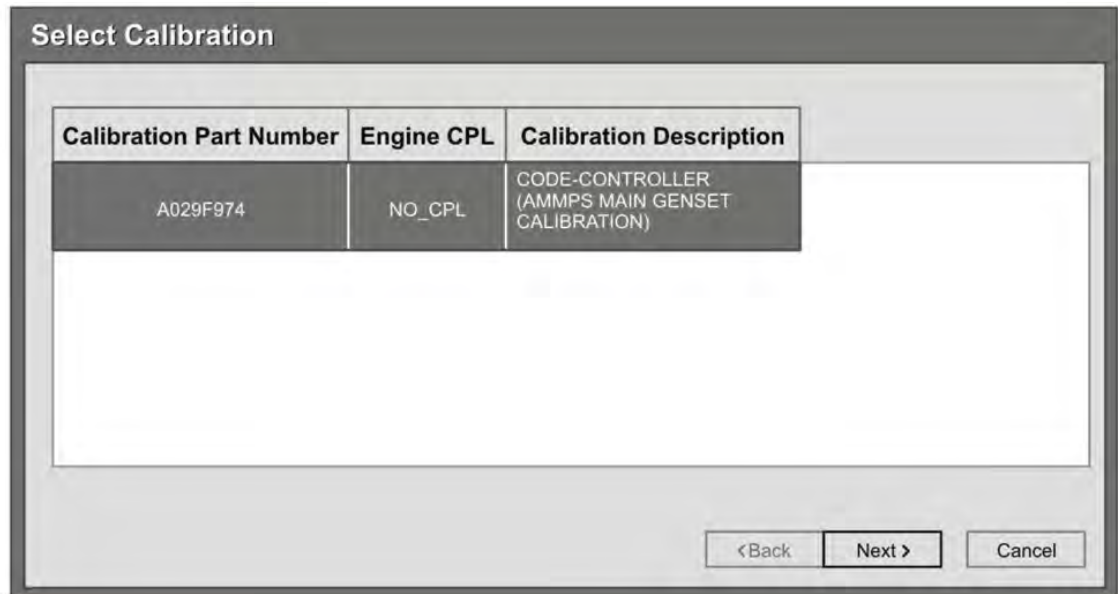


Figure 42. Select Calibration.

NOTE

Figure 42 is an example of a [Calibration Part Number]. [Calibration Part Number] may vary.

7. Select the appropriate [Calibration Part Number] and select [Next] (Figure 42).

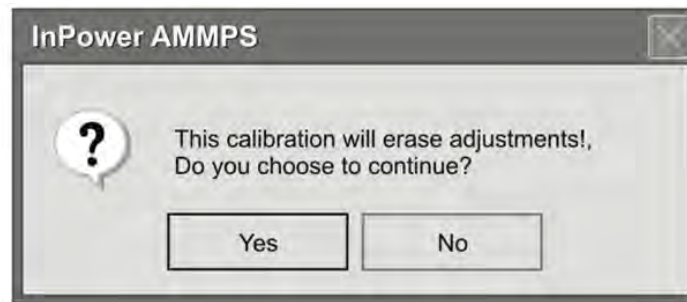


Figure 43. Calibration Erase.

8. Select [YES] if dialog box displays (Figure 43).

GENERAL MAINTENANCE – CONTINUED

History

Calibration Part Number: A029F974 Current Calibration Revision:

Description: CODE-CONTROLLER (AMMPS MAIN GENSET CALIBRATION) CD Calibration Revision:

Revision History	Calibration File	Revision Description
14DEC2009	A029F974	History to be updated

< Back Next > Cancel

Figure 44. History.

9. Choose [Next] if [History] displays the [Calibration File] selected in Step 7 (Figure 44).
10. Choose [Back] to select the correct calibration file if [History] displays a calibration file that does not match the [Calibration File] selected in Step 7 (Figure 44).

Save & Restore Parameters

Parameters Loaded From: Connected Device

Parameter Description	Value	Units
Fault History Table	<Data Table>	
Faults Occurrence Table	<Data Table>	

Set Data Plate From Capture File...

☐ Overlay Capture File After Calibration

< Back Next > Cancel

Figure 45. Save and Restore Parameters.

GENERAL MAINTENANCE – CONTINUED

11. Select [Next] after confirming that the correct information is displayed in [Save & Restore Parameters] (Figure 45).

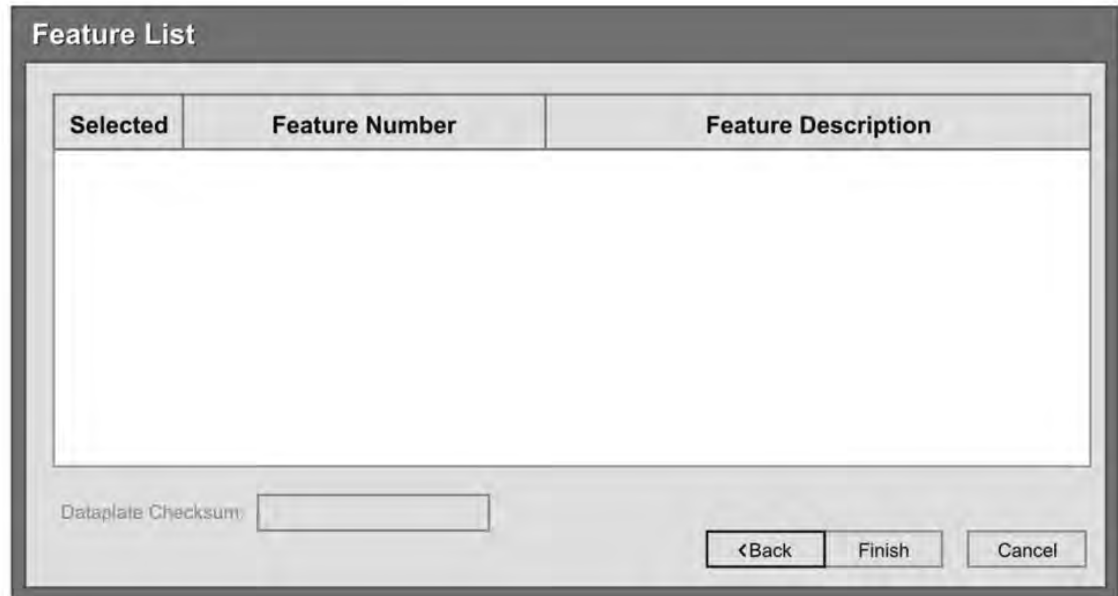


Figure 46. Feature List Finish.

12. Select [Finish] when [Feature List] dialog box displays (Figure 46).

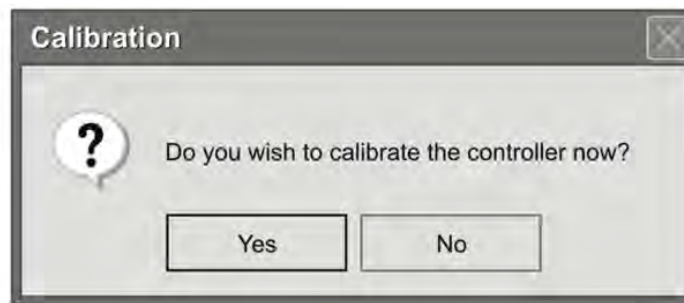


Figure 47. Confirm Calibration.

13. Select [Yes] after confirming that DCS is ready for calibration (Figure 47).

GENERAL MAINTENANCE – CONTINUED

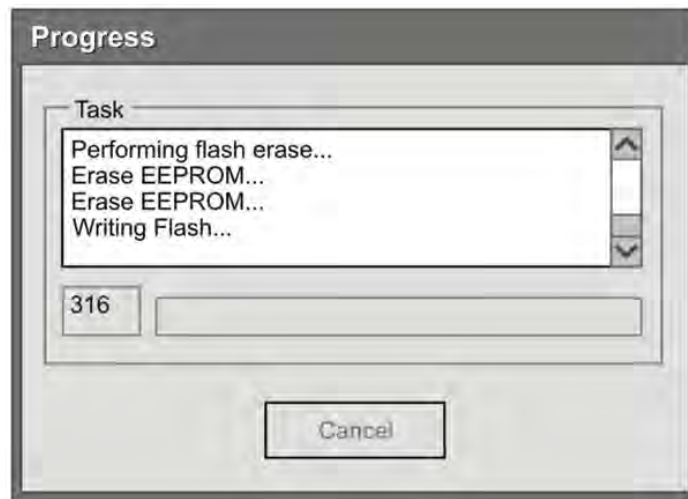


Figure 48. Calibration Progress.

NOTE

During the download, it is normal operation for the generator set control to display failure messages (e.g. [System Failure]) and DCS codes. Do not clear DCS codes or perform any other actions during the calibration file download or the download may be interrupted. When the download is complete, a final dialog box (Figure 49) informs the user the download completed successfully.

14. Monitor PC and DCS as calibration is downloaded (Figure 48) to ensure connections are not disturbed and power is not interrupted.

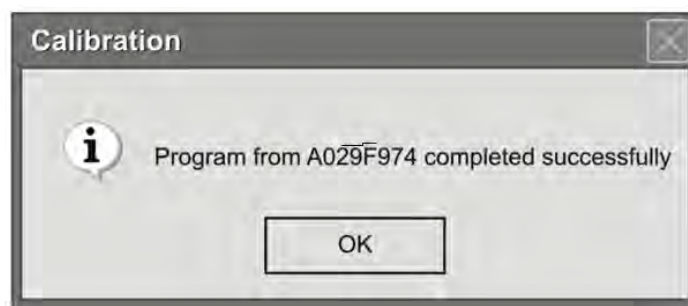


Figure 49. Calibration Completed Successfully.

NOTE

The calibration file download may take approximately 20 min, depending on PC performance and connection between DCS and PC. Calibration to the DCS may fail if battery is disconnected during the download process or if the cable drops off accidentally during the download. If DCS LED does not power on and will not power on after turning engine control switch to PRIME & RUN (TM 9-6115-749-10), proceed to Recovering AMMPS DCS if Initial or Update Calibration Fails task. PANEL LIGHTS will still work

GENERAL MAINTENANCE – CONTINUED

if calibration is interrupted. If PANEL LIGHTS do not work, proceed to electrical troubleshooting of DCS before attempting recovery of DCS (WP 0009, Electrical System Troubleshooting without a DCS Code).

15. Select [OK] when dialog box indicates [Calibration] has successfully completed (Figure 49).

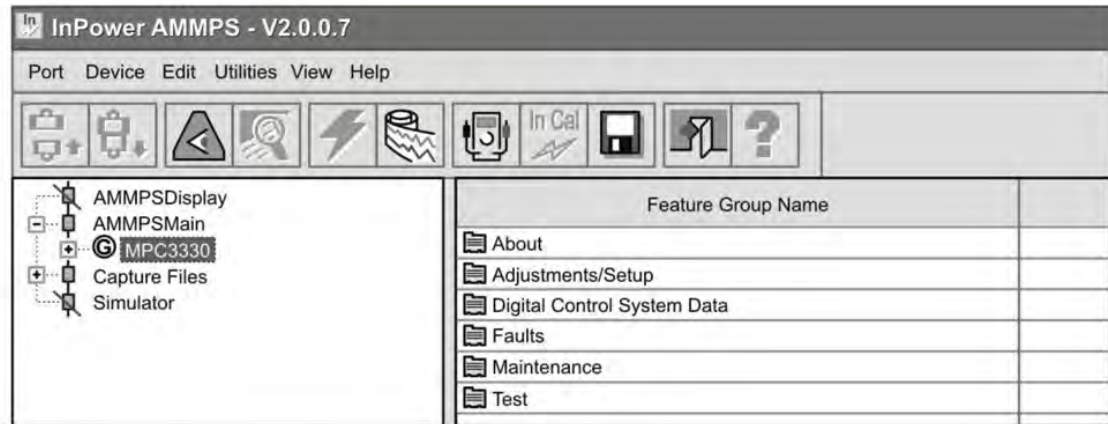


Figure 50. DCS Reconnect.

16. Observe PC screen to confirm InPower AMMPS automatically reconnected to [AMMPSMain] (Figure 50).
17. Overlay capture file and reset engine hours as required. See Using a Capture File to Overlay Data task.
18. Reset parameters as required if capture file is unavailable. See Using a Capture File to Overlay Data task, Steps 19 through 26 and Step 28.
19. Disconnect from [AMMPSMain] and remove local cable (Figure 10, Item 5) (with MAIN (Figure 10, Item 7) adapter).
20. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).
21. Start engine and check for proper operation (TM 9-6115-749-10).
22. Repair as required.

END OF TASK**Using Update Calibration to Install Display Firmware Updates**

1. Install battery ground cable (WP 0036, Remove/Install Batteries) and ensure battery power is supplied to the DCS (main DC circuit breaker ON (TM 9-6115-749-10)).

NOTE

Figure 10 shows a remote cable (Figure 10, Item 4) and a local cable (Figure 10, Item 5). Both cables utilize a RS-485 to RS-232 converter (Figure 10, Item 6). The RS-485 side of the converter plugs into the cable. The RS-232 side plugs into the compatible PC COM Port 1. DISPLAY (Figure 10, Item 8) adapter will be used for Step 2.

2. Connect a local cable (Figure 10, Item 5) (with DISPLAY (Figure 10, Item 8) adapter) to the DCS (Figure 10, Item 3) and a compatible PC (Figure 10, Item 1).

GENERAL MAINTENANCE – CONTINUED

NOTE

DCS screen will activate upon connection of remote operating cable.

3. Select and open InPower AMMPS icon from desktop or start menu. Install if necessary. See Installing InPower AMMPS to a Compatible PC task.

NOTE

[Update Calibration] feature is used to download a new display firmware version calibration file into a replacement or current DCS.

4. Select [AMMPSDisplay] from left-side explorer pane (Figure 51).

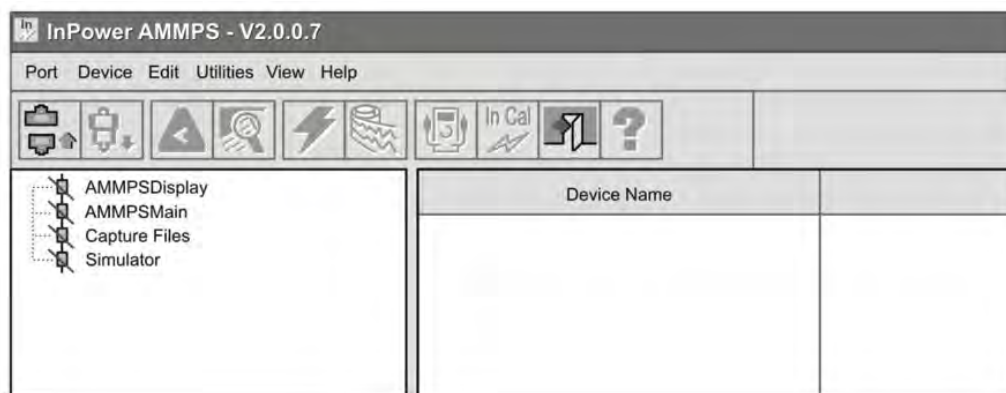


Figure 51. Connect to AMMPS Display.

5. Double-click on [AMMPSDisplay] (Figure 51) or select [Connect] from [Port] drop-down menu (Figure 52).
6. Check the following if InPower fails to connect:
 - a. Ensure COM port for [AMMPSDisplay] is correct and not being used by another device or program. Access [Add Site] from [Port] drop-down menu to change COM port or add a different COM port site.
 - b. Ensure proper RS-485 adapter is being utilized and is installed correctly (Figure 10).
 - c. Ensure battery power is supplied to DCS and DCS is on (Step 1).
 - d. Check all cables for proper installation and connections (Step 2).
7. Select [HMI400] from left-side explorer pane (Figure 53).
8. Select [Connect] from [Device] drop-down menu (Figure 54).

GENERAL MAINTENANCE – CONTINUED

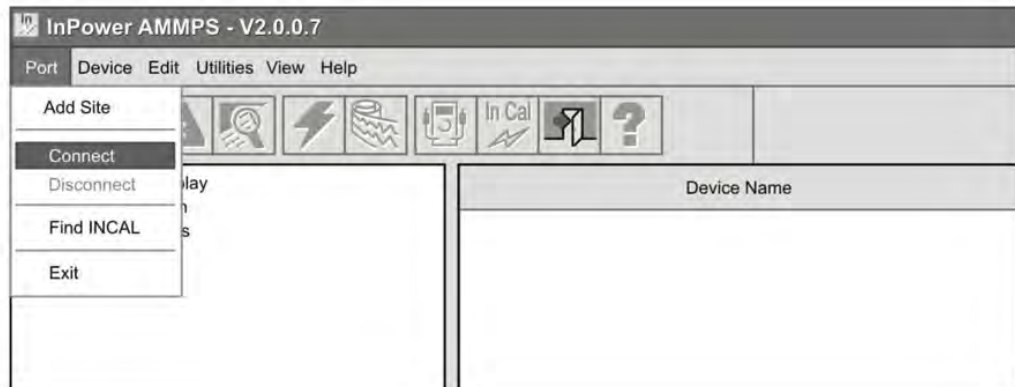


Figure 52. Port for AMMPS Display.

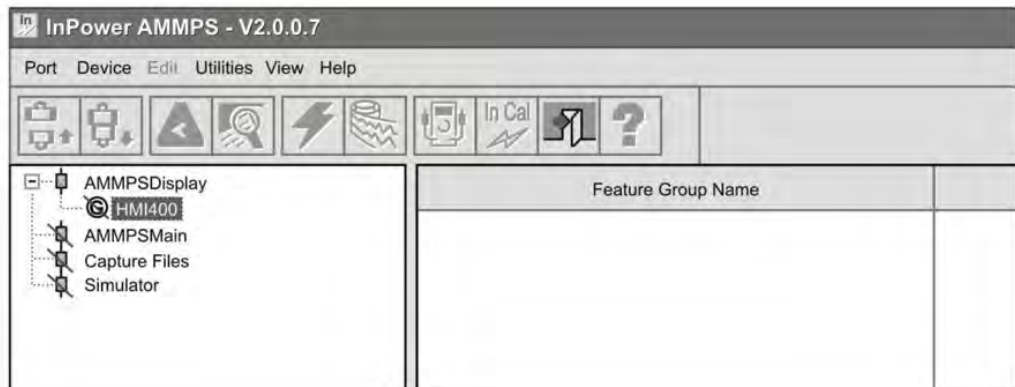


Figure 53. AMMPS Display Device HMI400.

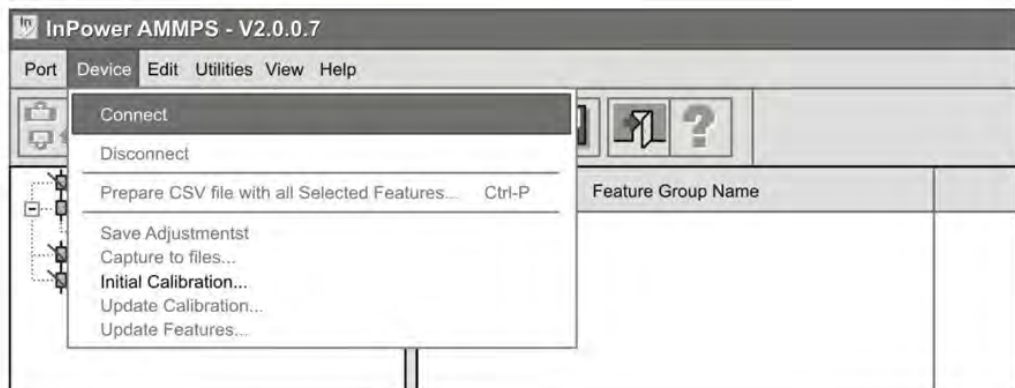


Figure 54. Device Connect Menu for AMMPS Display.

GENERAL MAINTENANCE – CONTINUED

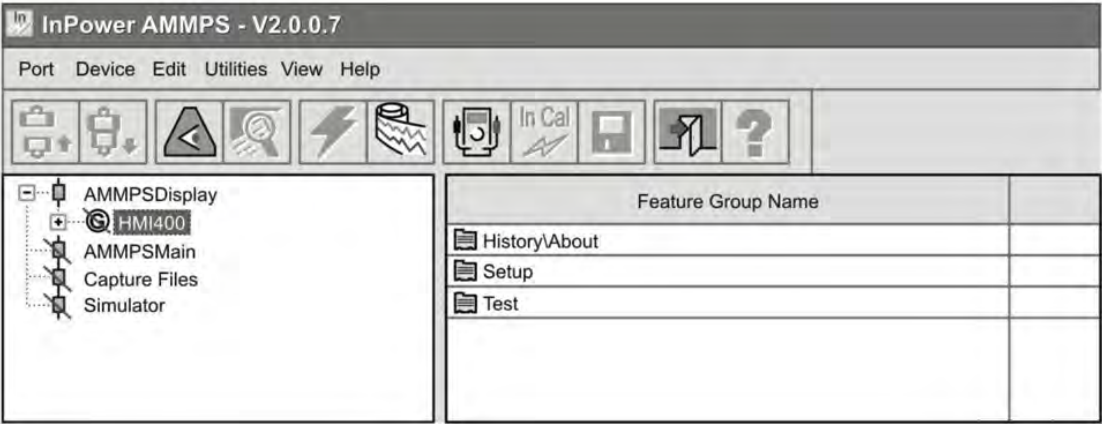


Figure 55. Highlight Display Device.

- 9. Select [HMI400] from left-side explorer pane once connected (Figure 55).

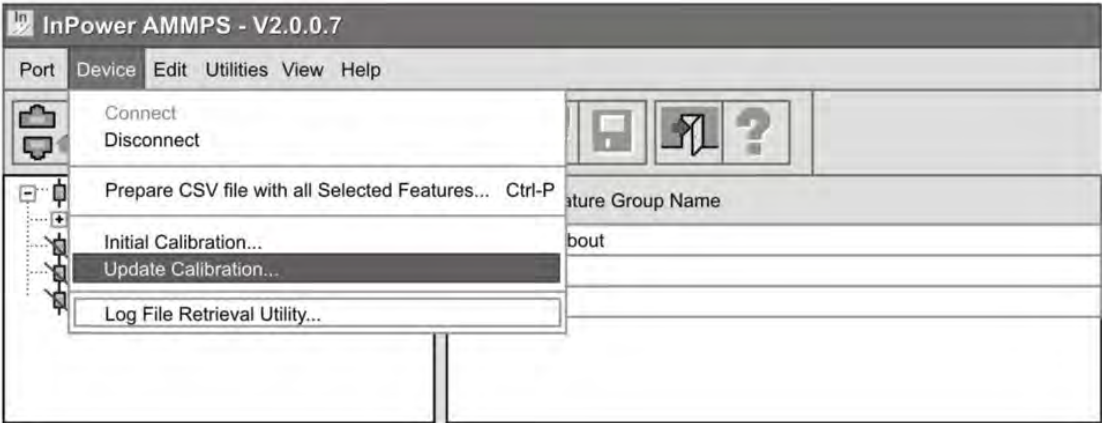


Figure 56. AMMPS Display Update Calibration.

- 10. Select [Update Calibration] from [Device] drop-down menu (Figure 56).
- 11. Select [Finish] on [History] dialog box (Figure 57).

GENERAL MAINTENANCE – CONTINUED

History

Calibration Part Number: A029F972 Current Calibration Revision:

Description: CODE-HMI(AMMPS DISPLAY CALIBRATION) CD Calibration Revision:

Revision History	Calibration File	Revision Description
14DEC2009	A029F972	History to be updated

<Back Finish Cancel

Figure 57. AMMPS Display History.

12. Select [Yes] on [Calibration] dialog box (Figure 58).

Calibration

?

Do you wish to calibrate the controller now ?

Yes No

Figure 58. AMMPS Display Dialog Box.

13. Monitor PC and DCS as calibration is downloaded to ensure connections are not disturbed and power is not interrupted.

NOTE

PC will automatically disconnect from DCS when display firmware has been updated.
InPower AMMPS will not need to be disconnected from DCS and can be closed.

14. Observe PC screen to confirm InPower AMMPS automatically disconnected from DCS.
15. Access DCS [About] screen to confirm display firmware has been updated (TM 9-6115-749-10).
16. Remove local cable (Figure 10, Item 5) (with DISPLAY (Figure 10, Item 8) adapter).
17. Turn engine control switch to PRIME & RUN (TM 9-6115-749-10).

GENERAL MAINTENANCE – CONTINUED

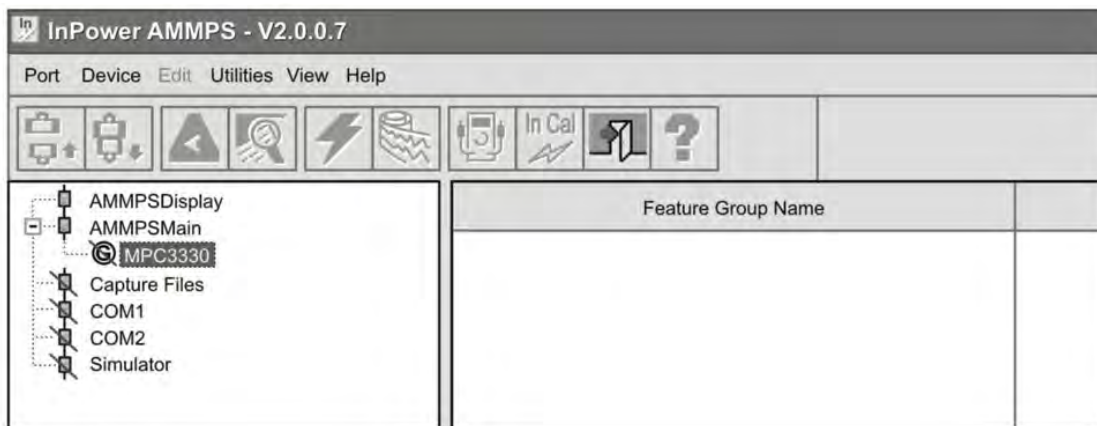
18. Start engine and check for proper operation (TM 9-6115-749-10).
19. Repair as required.

END OF TASK**Recovering AMMPS DCS if Initial Calibration Fails**

1. Attempt to connect to [AMMPSMain]. See Using InPower AMMPS on a Compatible PC task.

**Figure 59. Failed Connection.**

2. Check PC screen for dialog box indicating failed attempt (Figure 59).
3. Select [OK] and proceed to highlight [AMMPSMain] connection port (Figure 60).

**Figure 60. Highlight.**

4. Proceed to Using Initial Calibration to Install Control Firmware Updates task and complete Steps 5 through 22.
5. Test and replace DCS as required if symptom continues (WP 0017, Remove/Install DCS and WP 0018, Repair DCS).

END OF TASK

GENERAL MAINTENANCE – CONTINUED**Preparation for Storage (Less Than Nine Months)****NOTE**

Steps 1 through 6 must be completed monthly.

1. Perform operator Before PMCS (TM 9-6115-749-10).
2. Start generator set (TM 9-6115-749-10).
3. Allow generator set to operate until coolant temperature reaches 185 °F (85 °C).
4. Turn engine control switch OFF (TM 9-6115-749-10).
5. Perform operator After PMCS (TM 9-6115-749-10).
6. Ensure scheduled field maintenance PMCS (WP 0016, Field PMCS, Including Lubrication Instructions) has been performed as required.

END OF TASK**Preparation for Storage (9 Months to 36 Months)****NOTE**

Read all storage and preservation Steps that follow prior to performing them to avoid duplication of steps. Perform Steps in order given.

1. Ensure AMMPS 5 kW generator set is fully functional.
 - a. Perform operator Before PMCS (TM 9-6115-749-10).
 - b. Operate generator set at 80% load for 1/2 hour (TM 9-6115-749-10).
 - c. Perform operator After PMCS (TM 9-6115-749-10).
 - d. Verify generator set is fully mission-capable.
 - (1) Repair or replace all defects found while performing PMCS (TM 9-6115-749-10).
 - (2) Repeat Steps 1a through 1c.
2. Prepare cooling system for storage.
 - a. Start engine (TM 9-6115-749-10).
 - b. Operate generator set until [Coolant] reaches 180 °F (85 °C) if necessary.
 - c. Drain coolant (WP 0021, Service Cooling System).
 - d. Clean radiator interior (WP 0021, Service Cooling System).
 - e. Refill cooling system (WP 0021, Service Cooling System) with a mixture of 50% antifreeze and 50% distilled water (WP 0087, Lubrication Instructions).
3. Prepare fuel injection system for storage.
 - a. Fill a suitable 1 gal (4.55 L) or larger container with approved diesel fuel (WP 0087, Lubrication Instructions).
 - b. Fill a suitable 1 gal (4.55 L) or larger container with MIL-PRF-21260E, Grade PE-10 preservative oil.
 - c. Obtain a suitable 1 gal (4.55 L) or larger empty container.
 - d. Place containers outside of rear door.

GENERAL MAINTENANCE – CONTINUED

- e. Disconnect the main fuel pump from the fuel manifold (WP 0041, Remove/Install Fuel Pump Main/Auxiliary).
 - f. Connect a suitable flexible fuel line to the main fuel pump.
 - g. Disconnect fuel return line and place into empty container (WP 0040, Remove/Install Fuel Manifold).
 - h. Insert flexible fuel line from Step 3f into container containing approved diesel fuel.
 - i. Start engine (TM 9-6115-749-10) and operate for 2 min.
 - j. Transfer flexible fuel line from Step 3f to container of MIL-PRF-21260E, Grade PE-10 preservative oil.
 - k. Continue to operate engine until preservative oil flows from return line.
 - l. Turn engine control switch to OFF (TM 9-6115-749-10).
 - m. Replace fuel filter/water separator element (WP 0043, Replace Fuel Filter/Water Separator Element).
 - n. Install main fuel pump (WP 0041, Remove/Install Fuel Pump Main/Auxiliary).
4. Prepare valves, intake system, and cylinders for storage.
- a. Remove air intake hose at intake manifold (WP 0019, Remove/Install Air Intake Hose Assemblies).
 - b. Fill an oil gun with MIL-PRF-21260E, Grade PE-10 preservative lubricating oil.
 - c. Spray oil into opening of intake manifold for 15 sec while cranking the engine using the DEAD CRANK SWITCH (TM 9-6115-749-10).

CAUTION

Do not crank engine in excess of 15 sec. Allow starter to cool for at least 15 sec between cranks. Failure to comply may cause damage to equipment.

- d. Repeat Step 4c for three additional periods of 15 sec each.
 - e. Install air intake hose removed in Step 4a.
5. Prepare lubrication system for storage.
- a. Drain engine oil (WP 0066, Service Lubrication System).
 - b. Replace oil filter (WP 0066, Service Lubrication System).
 - c. Fill engine crankcase (WP 0066, Service Lubrication System) with preservative lubricating oil conforming to grade 10, 30, or 15-40 of MIL-PRF 21260E.
 - d. Crank the engine for 15 sec using the DEAD CRANK SWITCH (TM 9-6115-749-10).

CAUTION

Do not crank engine in excess of 15 sec. Allow starter to cool for at least 15 sec between cranks. Failure to comply may cause damage to equipment.

- e. Repeat Step 5d for three additional periods of 15 sec each.
6. Prepare 24 V electrical system for storage.

GENERAL MAINTENANCE – CONTINUED**WARNING**

Do not damage batteries. Storage batteries are filled with a liquid acid that can leak from sealed battery when case is broken. Contact with acidic liquid can burn skin and eyes. Wear safety goggles and chemical gloves and avoid acid splash while handling damaged batteries. Do not move batteries by terminals. Failure to comply may cause injury or death to personnel or damage to equipment.

- a. Clean dirt, acid, and other residues from top of batteries.
- b. Remove batteries from generator set (WP 0036, Remove/Install Batteries).
- c. Check voltage of the removed batteries (WP 0036, Remove/Install Batteries).

CAUTION

Charge Absorbed Glass Mat (AGM) batteries only with a device with an AGM setting or that can regulate the voltage between 14.25 V and 14.75 V. Failure to comply will cause damage to equipment.

- d. Charge Absorbed Glass Mat (AGM) batteries as required.
 - (1) When charge level is less than 12.7 V.
 - (2) Charge every six months.
 - e. Charge flooded wet cell batteries as required.
 - (1) When charge level is less than 12.5 V.
 - (2) Charge every three months.
7. Prepare fuel system for storage.
- a. Drain fuel/preservative oil mixture from the fuel supply lines between the fuel filter/water separator and the fuel tank (WP 0039, Service Fuel System).
 - b. Drain fuel tank (WP 0039, Service Fuel System).
 - c. Clean fuel strainers (WP 0039, Service Fuel System).
8. Prepare AC generator for storage.
- a. Seal endbell vents with tape meeting SAE-AMS-T-22085 standard.
 - b. Seal generator fan screen with tape meeting SAE-AMS-T-22085 standard.
 - c. Seal wire ports in generator housing with tape meeting SAE-AMS-T-22085 standard.
9. Prepare diesel engine for storage.
- a. Clean dipstick and dipstick tube of dirt and oil and then seal dipstick/dipstick tube junction with tape meeting SAE-AMS-T-22085 standard.
 - b. Clean oil fill of dirt and oil and then seal with tape meeting SAE-AMS-T-22085 standard.
10. Lubricate all doors IAW WP 0087, Lubrication Instructions and close securely.
11. Prepare three warning tags stating "THIS GENERATOR SET HAS BEEN PRESERVED. CHANGE FUEL FILTERS AND ENGINE OIL AND PERFORM PMCS" and attach to:
- a. Dipstick.
 - b. Oil filler cap.
 - c. Engine control switch.

GENERAL MAINTENANCE – CONTINUED**CAUTION**

Adequate airflow must be provided around generator set when stored under a tent or tarp. Failure to comply will cause damage to equipment.

NOTE

Store generator set inside an enclosed structure (preferred) or under roof when possible. When storing generator set outside, cover with a tent or tarp. Allow at least 36 in (0.91 m) space between cover and generator set on all sides to ensure adequate airflow.

12. Move generator set into storage.

END OF TASK**Replace Freeze Plug****NOTE**

Several freeze plugs of varying sizes are installed on the engine block. The procedure to replace each freeze plug is the same regardless of size or location.

NOTE

It is not necessary to remove the engine assembly from the generator set to replace a freeze plug.

1. Drain cooling system (WP 0021, Service Cooling System).
2. Relocate or remove any engine components that restrict access the freeze plug to be replaced. Refer to the relevant WP for the proper procedure to relocate or remove the component.
3. Place wiping rags under freeze plug (Figure 61, Item 1) to absorb any residual coolant that may spill when freeze plug has been removed.

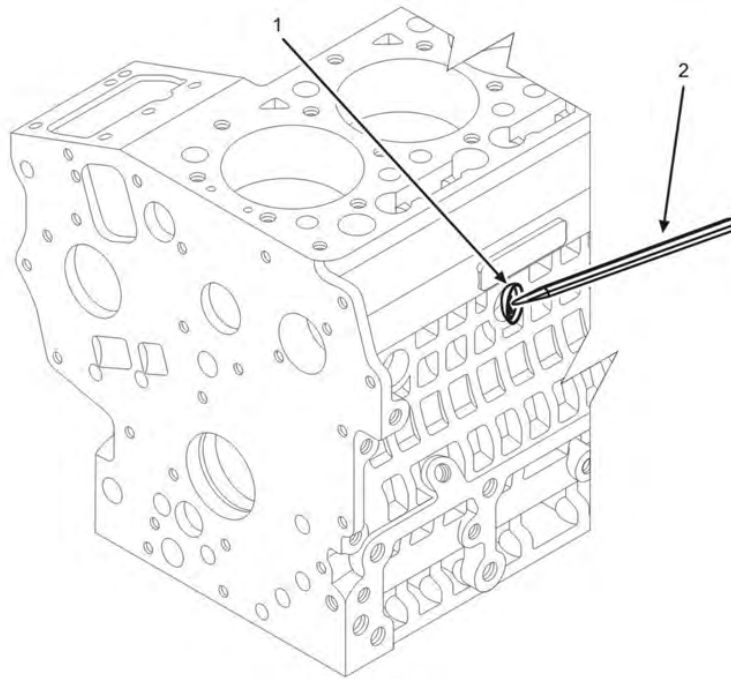
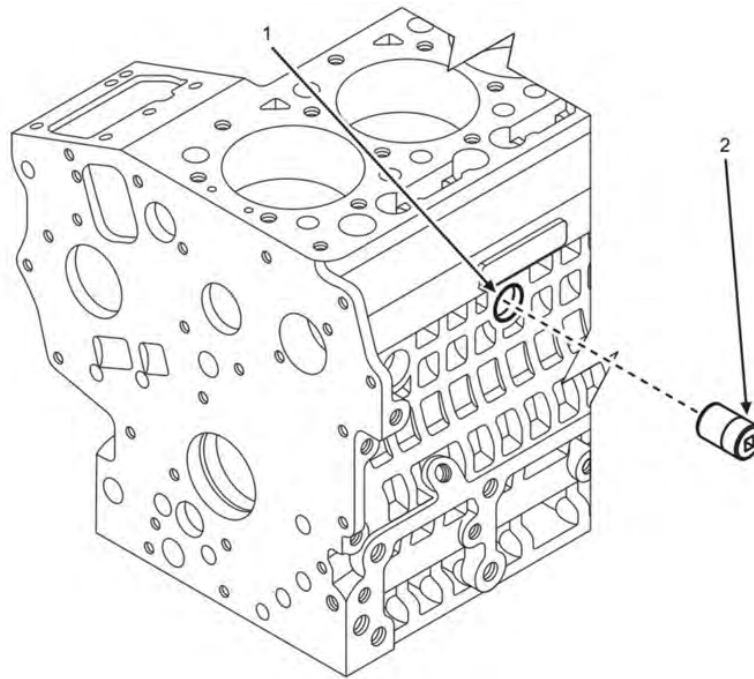
GENERAL MAINTENANCE – CONTINUED

Figure 61. Remove Freeze Plug.

CAUTION

Use of excessive force with the hammer when removing freeze plug may cause freeze plug to be pushed inside engine block. Use care not to push freeze plug into engine block when removing it. Failure to comply may cause damage to equipment.

4. Remove freeze plug (Figure 61, Item 1) by tapping with a hammer and punch (Figure 61, Item 2) until freeze plug (Figure 61, Item 1) cocks in opening of engine block.
5. Remove and discard freeze plug (Figure 61, Item 1) from opening in engine block.
6. Remove dirt, debris, and oil from opening in engine block by wiping with a wiping rag.

GENERAL MAINTENANCE – CONTINUED**Figure 62. Install Freeze Plug.**

7. Remove any burrs from opening using crocus cloth.
8. Position new freeze plug (Figure 62, Item 1) to opening in engine block.
9. Tap freeze plug (Figure 62, Item 1) into opening using a hammer and the proper size socket (Figure 62, Item 2) until freeze plug (Figure 62, Item 1) is fully seated into opening of engine block.
10. Replace any engine components previously removed or relocated.
11. Fill the cooling system (WP 0021, Service Cooling System).

WARNING

Starting engine when unit is partially disassembled is dangerous. Operate engine in this condition only as long as required to test operation. Keep away from unprotected moving engine parts during operation. Failure to comply may cause injury or death to personnel.

12. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
13. Start engine and run for 5 min (TM 9-6115-749-10).
14. Inspect cooling system (WP 0021, Service Cooling System) for leaks. Repair as required.
15. Stop engine and let cool.
16. Check coolant level in recovery bottle (WP 0021, Service Cooling System) and add coolant as required to bring level of coolant in bottle to LOW marking line.
17. Dispose of spilled coolant and soiled wiping rags IAW local SOP.

END OF TASK

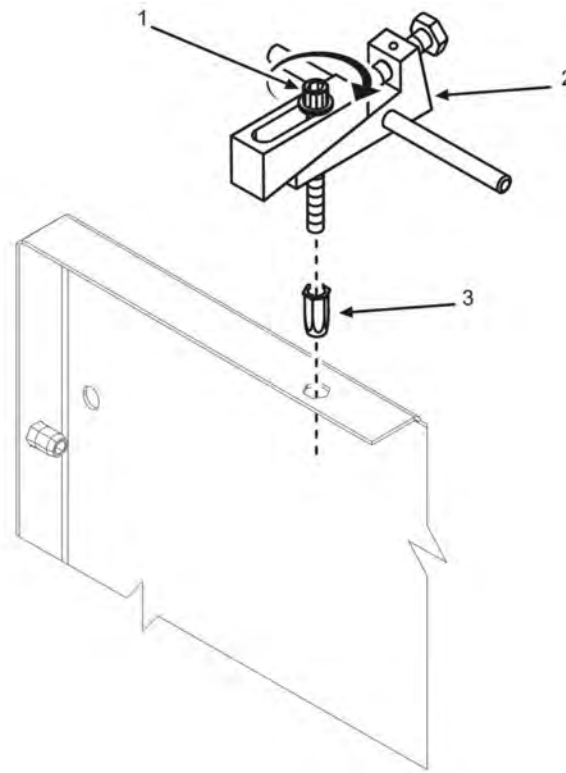
GENERAL MAINTENANCE – CONTINUED**Install Clinch Nut**

Figure 63. Clinch Nut to Rivet Tool.

1. Install new clinch nut (Figure 63, Item 3) to rivet nut tool (Figure 63, Item 2) by turning socket head screw (Figure 63, Item 1) clockwise until clinch nut (Figure 63, Item 3) is fully installed on tool.

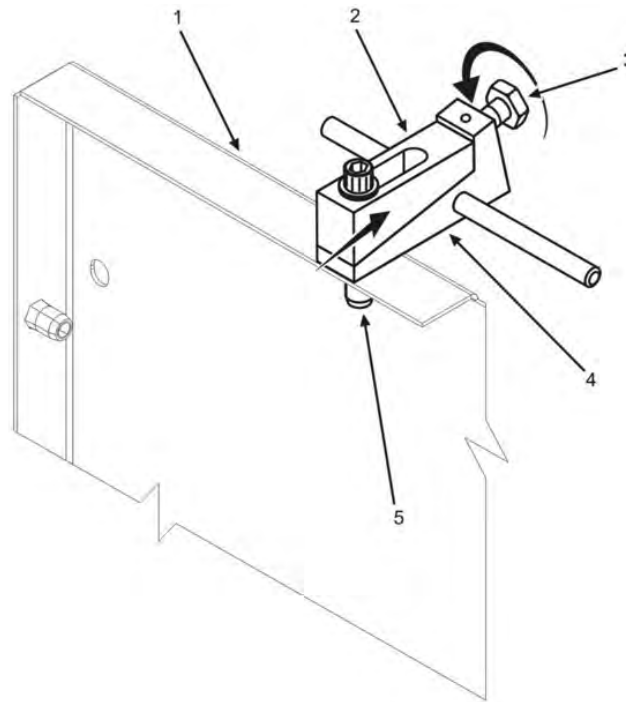
GENERAL MAINTENANCE – CONTINUED

Figure 64. Install Clinch Nut to Panel.

CAUTION

Prior to tightening hex head screw (Figure 64, Item 3), position rivet nut tool (Figure 63, Item 2) flush with panel (Figure 64, Item 1) surface. Failure to comply may result in damage to equipment.

2. Install clinch nut (Figure 64, Item 5) into opening in panel (Figure 64, Item 1) with bottom surface of tool (Figure 64, Item 4) flush with panel (Figure 64, Item 1).
3. Turn hex head screw (Figure 64, Item 3) clockwise to draw top wedge (Figure 64, Item 2) of tool toward hex head screw (Figure 64, Item 3).
4. Continue to tighten hex head screw (Figure 64, Item 3) until top wedge (Figure 64, Item 2) is fully seated on bottom wedge (Figure 64, Item 4) of tool.

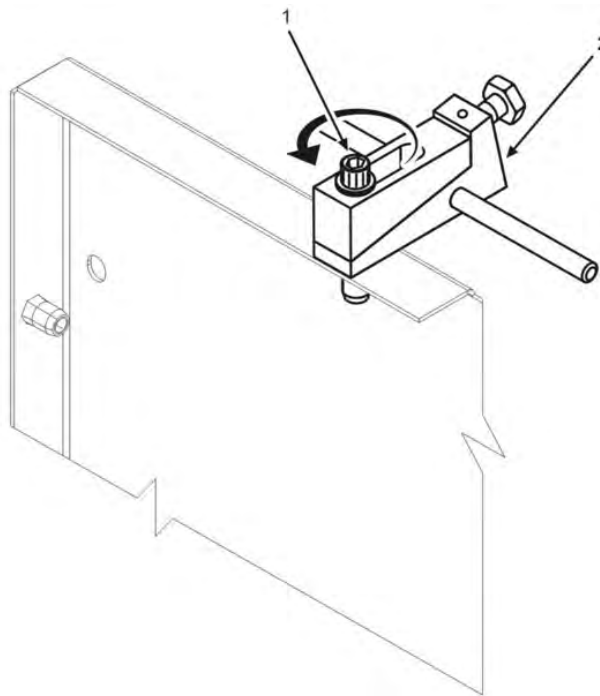
GENERAL MAINTENANCE – CONTINUED

Figure 65. Remove Rivet Nut Tool.

5. Turn socket head screw (Figure 65, Item 1) counterclockwise to remove tool (Figure 65, Item 2) from panel.

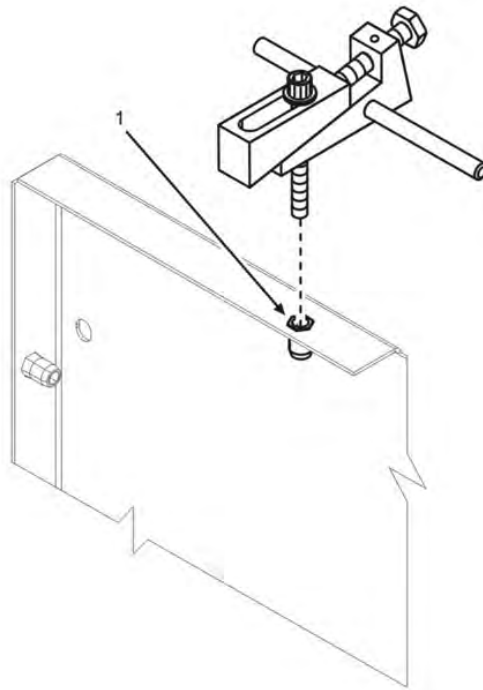
GENERAL MAINTENANCE – CONTINUED

Figure 66. Installed Clinch Nut.

6. Use installed clinch nut (Figure 66, Item 1) to secure panel as required.

CLEARING WARNING 3661 “MAINTENANCE ITEM ACTIVE” CODES DISPLAYED ON DCS**NOTE**

Warning 3661 code will flash in yellow on the DCS screen and appears when the time interval for a generator set Maintenance Item or Deferred Maintenance Item has expired or requires a Maintenance Action. Address the maintenance item and perform maintenance as required. When completed reset the code.

1. Select “Maintenance” from the lower right side of the DCS screen. The screen now displays Maintenance Items in green with “Tip displayed”.
2. Select “Maint. Items” located on lower right side of DCS screen.
3. Use the “NEXT” button to scroll through the “Maint. Item” list to find the maintenance item(s) to be cleared.
4. Once the code being cleared appears in the “Maint Items” box; select “Maint. Actions” in lower right corner of DCS. (If deferred, dismissed, or canceled is selected another screen will appear and Completed may be selected on that screen).
5. Select “Completed” or the desired action from the group that appears in the “Tip” box on the DCS screen.
6. Select “Confirm”.
7. Select “Exit”.
8. Select “Fault Reset” and code is now cleared.

END OF TASK

END OF WORK PACKAGE

FIELD AND SUSTAINMENT MAINTENANCE
ILLUSTRATED LIST OF MANUFACTURED ITEMS INTRODUCTION

INITIAL SETUP:**Not Applicable****ILLUSTRATED LIST OF MANUFACTURED ITEMS INTRODUCTION****Scope**

WP 0093.2 through 0093.4 include complete instructions for making items authorized to be manufactured or fabricated at the field.

How to Use the Index of Manufactured Items

A part number index in alphanumeric order is provided for cross-referencing the part number of the item to be manufactured to the information which covers fabrication criteria.

Explanation of the Illustrations of Manufactured Items

All instructions needed by maintenance personnel to manufacture the item are included on the illustrations. All bulk materials needed for manufacture of an item are listed by part number or specification number in a tabular list.

INDEX OF MANUFACTURED ITEMS

P/N AND/OR DWG NO	PART DESCRIPTION	REFERENCE
04-20013	INSULATION SLEEVING	WP 0093.2, Figure 1
04-20447	INSULATION SLEEVING	WP 0093.2, Figure 1
04-20448	STRAND,WIRE	WP 0093.2, Figure 1
04-20491	STRAND, WIRE	WP 0093.2, Figure 1
04-20533	STRAND, WIRE	WP 0093.2, Figure 1
04-20547	CABLE, SPECIAL PURPOSE	WP 0093.2, Figure 1
04-20567	STRAND, WIRE	WP 0093.2, Figure 1
04-20575	STRAND,WIRE	WP 0093.2, Figure 1
04-20727	HOSE,COOLANT	WP 0093.3, Figure 1
04-20768	CABLE,POWER,ELECTRICAL	WP 0093.2, Figure 1
04-20852-1	HOSE,FUEL	WP 0093.3, Figure 1
04-20872-1	SEAL,EDGE	WP 0093.4, Figure 1
04-20901	STRAND, WIRE	WP 0093.2, Figure 1
04-20902-1 and 04-20902-2	EDGING	WP 0093.4, Figure 1
04-21070-3	HOSE, VENT RADIATOR	WP 0093.3, Figure 1
04-21070-4	HOSE, VENT RADIATOR	WP 0093.3, Figure 1
04-21030-1	SEAL,EDGE	WP 0093.4, Figure 1
04-21031-1	SEAL,EDGE	WP 0093.4, Figure 1
04-21031-5	SEAL, EDGE	WP 0093.4, Figure 1

ILLUSTRATED LIST OF MANUFACTURED ITEMS INTRODUCTION – CONTINUED

P/N AND/OR DWG NO	PART DESCRIPTION	REFERENCE
04-21158	WIRE, STRANDED	WP 0093.2, Figure 1
04-21208-3	HOSE, NONMETALLIC	WP 0093.3, Figure 1
04-21208-4	HOSE, NONMETALLIC	WP 0093.3, Figure 1
04-21282-1	SEAL, WEATHER	WP 0093.4, Figure 1
04-21485	HOSE, FUEL	WP 0093.3, Figure 1
04-21547-3	TUBE, FLEXIBLE	WP 0093.3, Figure 1
04-21713	INSULATION SLEEVING	WP 0093.2, Figure 1
04-21748-1	SEAL, EDGE	WP 0093.4, Figure 1
55PP02872757640064	INSULATION SLEEVING	WP 0093.2, Figure 1
88-20541-1	INSULATION SLEEVING	WP 0093.2, Figure 1
88-20541-9	INSULATION SLEEVING	WP 0093.2, Figure 1
88-20541-11	INSULATION SLEEVING	WP 0093.2, Figure 1
88-20541-15	INSULATION SLEEVING	WP 0093.2, Figure 1

END OF TASK**END OF WORK PACKAGE**

FIELD AND SUSTAINMENT MAINTENANCE

CABLE, SPECIAL PURPOSE, CABLE, WIRE, STRAND AND SLEEVING, INSULATING

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (GMTK) (WP 0162, 91D (1)
Table 2, Item 32)

Personnel Required

Materials/Parts

Wires, Strand (WP 0104)

CABLE, SPECIAL PURPOSE, CABLE, WIRE, STRAND AND SLEEVING, INSULATING



PROCEDURES:

1. Cut wire (Figure 1, Item 1) to required length.
2. Strip 0.75 inch of insulation from each end of wire (Figure 1, Item 1).

List of Bulk Materials

DESCRIPTION	QUANTITY	IDENTIFYING NUMBER
INSULATION SLEEVING, (CUT TO LENGTH AS REQUIRED) P/N 04-20013	1	P/N 55PP02872757640064
INSULATION SLEEVING,(CUT TO LENGTH AS REQUIRED), P/N 04-20447	2	P/N EY-1877
STRAND, WIRE (CUT TO LENGTH AS REQUIRED), P/N 04-20448	10	P/N 3271-16-26
STRAND, WIRE 16 AWG, (CUT TO LENGTH AS REQUIRED), P/N 04-20491	1	P/N EF20C0038722

Figure 1. Cable, Special Purpose, Cable, Shielded, Wire, Strand and Insulation Sleeve (Sheet 1 of 2)

CABLE, SPECIAL PURPOSE, CABLE, WIRE, STRAND AND SLEEVING, INSULATING - CONTINUED

DESCRIPTION	QUANTITY	IDENTIFYING NUMBER
STRAND, WIRE, (CUT TO LENGTH AS REQUIRED), P/N 04-20533	3	P/N 327-6-133
CABLE, SPECIAL PURPOSE, 18 AWG, (CUT TO LENGTH AS REQUIRED) P/N 04-20547	1	P/N EF20C0028722
STRAND, WIRE, (CUT TO LENGTH AS REQUIRED) P/N 04-20567	6	P/N 3271-8-133
STRAND, WIRE, 10 AWG, (MAKE FROM 04-21051-1 ON BULK ITEMS LIST CUT TO LENGTH AS NEEDED)	1	P/N 04-20575
CABLE, POWER, ELECTRICAL, (CUT TO LENGTH AS REQUIRED) P/N 04-20768	1	P/N 89418
WIRE, STRAND, (CUT TO LENGTH AS REQUIRED) P/N 04-20901	2	P/N 3271-20-10
WIRE, STRANDED 12 AWG, (CUT TO LENGTH AS REQUIRED) P/N 04-21158	10	P/N 3271-12-65
SLEEVING, INSULATION, ELECTRICAL (CUT TO LENGTH AS REQUIRED), P/N 04-21713	1	P/N TFT-250-16
INSULATION SLEEVING, (CUT TO LENGTH AS REQUIRED) P/N 04-20013	1	P/N EY-1877
INSULATION SLEEVING, (CUT TO LENGTH AS REQUIRED) P/N 88-20541-1	2	P/N 88-20541
INSULATION SLEEVING, ELECTRICAL, (CUT TO LENGTH AS REQUIRED) P/N 88-20541-9	2	P/N 88-20541
INSULATION, SLEEVING, (CUT TO LENGTH AS REQUIRED) P/N 88-20541-11	1	P/N 88-20541
SLEEVING, INSULATING, (CUT TO LENGTH AS REQUIRED) P/N 88-20541-15	1	P/N 88-20541

Figure 1. Cable, Special Purpose, Cable, Shielded, Wire, Strand and Insulation Sleeve (Sheet 2 of 2)**END OF TASK****END OF WORK PACKAGE**

FIELD AND SUSTAINMENT MAINTENANCE
HOSE, NONMETALLIC, METALLIC AND TUBE

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162,
Table 2, Item 32)

Materials/Parts - cont'd

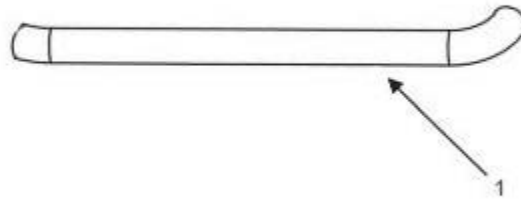
Hose, Metallic (WP 0110)

Materials/Parts

Hose, Nonmetallic (WP 0110)

Personnel Required

91D (1)

**PROCEDURES:**

1. Cut hose (Figure 1, Item 1), to desired length or the length of hose being replaced.
2. Connect hose to equipment as required in accordance with the appropriate work package.

List of Bulk Materials

DESCRIPTION	QUANTITY	IDENTIFYING NUMBER
HOSE, COOLANT, (CUT TO LENGTH AS REQUIRED) P/N 04-20727	1	P/N 04-20577
HOSE, FUEL 5/32 IN ID, (CUT TO LENGTH AS REQUIRED) P/N 04-20852-1	1	P/N 04-20851
HOSE, VENT RADIATOR, (CUT TO LENGTH AS REQUIRED) P/N 04-21070-3	2	P/N 3058529

Figure 1. Hose, Nonmetallic, Metallic and Tube, Flexible (Sheet 1 of 2)

DESCRIPTION	QUANTITY	IDENTIFYING NUMBER
HOSE, VENT RADIATOR, (CUT TO LENGTH AS REQUIRED) P/N 04-21070-4	1	P/N 3058529
HOSE, NONMETALLIC 3/4 IN ID, (CUT TO LENGTH AS REQUIRED) P/N 04-21208-3	2	P/N 04-20200
HOSE, NONMETALLIC 3/4 IN ID, (CUT TO LENGTH AS REQUIRED) P/N 04-21208-4	1	P/N 04-20200
HOSE, FUEL, (CUT TO LENGTH AS REQUIRED) P/N 04-21485	1	P/N 42190109
TUBE, FLEXIBLE, (CUT TO LENGTH AS REQUIRED) P/N 04-21547-3	1	P/N 04-20462

Figure 1. Hose, Nonmetallic, Metallic, and Tube, Flexible (Sheet 2 of 2)

END OF TASK

END OF WORK PACKAGE

FIELD AND SUSTAINMENT MAINTENANCE
SEAL, EDGE AND WEATHER

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162,
Table 2, Item 32)

Materials/Parts - cont'd

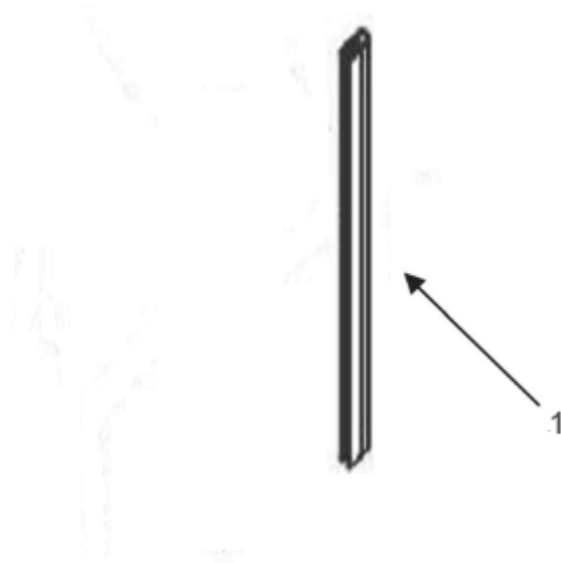
Seal, Weather (WP 0104)

Materials/Parts

Seal, Edging (WP 0114)

Personnel Required

91D (1)

SEAL, EDGE AND WEATHER**PROCEDURES:**

1. Cut seal (Figure 1, Item 1), to required length or the length of seal being replaced.

List of Bulk Materials

DESCRIPTION	QUANTITY	IDENTIFYING NUMBER
SEAL, EDGE (CUT TO LENGTH AS REQUIRED) P/N 04-20872-1	4	P/N 04-20868
EDGING, (CUT TO LENGTH AS REQUIRED) P/N 04-20902-1 and P/N 04-20902-2	3	P/N 04-20249

Figure 1. Seal, Edge and Weather (Sheet 1 of 2)

SEAL, EDGE AND WEATHER - CONTINUED

DESCRIPTION	QUANTITY	IDENTIFYING NUMBER
SEAL, EDGE, (CUT TO LENGTH AS REQUIRED) P/N 04-21030-1	2	P/N 04-20868
SEAL, EDGE, (CUT TO LENGTH AS REQUIRED) P/N 04-21031-1	2	P/N A1512
SEAL, EDGE, (CUT TO LENGTH AS REQUIRED) P/N 04-21031-5	2	P/N A1512
SEAL, WEATHER (CUT TO LENGTH AS REQUIRED) P/N 04-21282-1	1	P/N A2539
SEAL, EDGE (CUT TO LENGTH AS REQUIRED) P/ N04-21748-1	2	P/N 04-20868

Figure 1. Seal, Edge and Weather (Sheet 2 of 2)**END OF TASK****END OF WORK PACKAGE**

SUSTAINMENT MAINTENANCE

REMOVE/INSTALL HARMONIC BALANCER

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
 Wrench, Torque, Click, Ratcheting, 1/2 in Drive, 250 ft•lb (WP 0162, Table 2, Item 40)

Personnel Required

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Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool
 Front body panel removed (WP 0029, Remove/Install Front Body Panel)
 Battery-Charging alternator belt removed (WP 0076, Remove/Install Battery-Charging Alternator Belt)

Materials/Parts

Pulley, fan drive (WP 0148, Item 1)
 Lubricating oil, engine (WP 0163, Table 1, Item 23)

REMOVE/INSTALL HARMONIC BALANCER**Remove Harmonic Balancer****NOTE**

It will be necessary to prevent the crankshaft (Figure 1, Item 3) from turning while loosening the harmonic balancer (Figure 1, Item 2) bolt (Figure 1, Item 1).

1. Ensure equipment conditions are met in order presented in initial setup.
2. Remove bolt (Figure 1, Item 1) securing harmonic balancer (Figure 1, Item 2) to crankshaft (Figure 1, Item 3).
3. Verify that alignment marks (Figure 1, Item 4) are clearly visible on harmonic balancer (Figure 1, Item 2) and crankshaft (Figure 1, Item 3).
4. Modify the alignment marks (Figure 1, Item 4) as required for clear visibility.
5. Remove harmonic balancer (Figure 1, Item 2) from crankshaft (Figure 1, Item 3) using a gear puller.
6. Place harmonic balancer (Figure 1, Item 2) on suitable work surface.

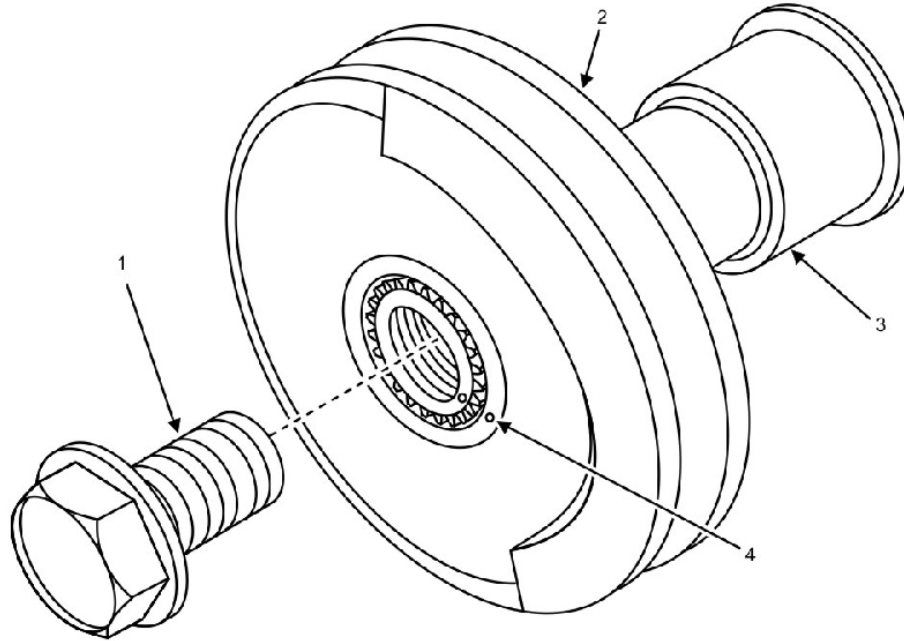
REMOVE/INSTALL HARMONIC BALANCER – CONTINUED

Figure 1. Harmonic Balancer - Removal.

END OF TASK**Inspect Harmonic Balancer**

1. Inspect harmonic balancer (Figure 1, Item 2) for cracks, corrosion, or damage, and replace as required.
2. Inspect crankshaft (Figure 1, Item 3) end for cracks, corrosion, or damage. Notify supervisor if replacement is required.

END OF TASK**Install Harmonic Balancer****CAUTION**

Be sure to properly align alignment marks (Figure 1, Item 4) on crankshaft (Figure 1, Item 3) with timing marks on harmonic balancer (Figure 1, Item 2). Failure to comply may cause damage to equipment.

1. Install harmonic balancer (Figure 1, Item 2) to crankshaft (Figure 1, Item 3), aligning timing marks (Figure 1, Item 4) on each part as shown.

NOTE

It will be necessary to prevent crankshaft (Figure 1, Item 3) from turning while tightening bolt (Figure 1, Item 1).

2. Secure harmonic balancer (Figure 1, Item 2) to crankshaft (Figure 1, Item 3) by installing bolt (Figure 1, Item 1) finger-tight.
3. Secure bolt (Figure 1, Item 1). Torque bolt to 87-94 ft•lb (118-125 N•m)

REMOVE/INSTALL HARMONIC BALANCER – CONTINUED

4. Install battery-charging alternator belt (WP 0076, Remove/Install Battery-Charging Alternator Belt).
5. Install front body panel (WP 0029, Remove/Install Front Body Panel).
6. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
7. Start engine and check for proper operation (TM 9-6115-749-10).
8. Repair as required.

END OF TASK

END OF WORK PACKAGE

SUSTAINMENT MAINTENANCE

REMOVE/INSTALL GEAR CASE COVER

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
 Wrench, Torque, Click, Ratcheting, 3/8 in Drive, 75 ft•lb (WP 0162, Table 2, Item 41)

Materials/Parts

Bolt (2) (WP 0128, Item 2)
 Bolt (22) (WP 0137, Item 2)
 Bolt (1) (WP 0147, Item 11)
 Bolt (2) (WP 0147, Item 13)
 Bolt (9) (WP 0147, Item 14)
 Bolt (2) (WP 0147, Item 15)
 Bolt (1) (WP 0147, Item 16)
 Bolt, machine (2) (WP 0128, Item 1)
 Bolt, machine (5) (WP 0131, Item 1)
 Comp, case gear (WP 0147, Item 1)
 Gasket (WP 0131, Item 3)
 Gasket (WP 0128, Item 15)
 Gasket, gear case (WP 0147, Item 5)
 Seal, oil (1) (WP 0147, Item 12)
 Gasket, actuator (WP 0134, Item 3)

Materials/Parts - cont'd

Compound, sealing (WP 0163, Table 1, Item 15)
 Lubricating oil, engine (WP 0163, Table 1, Item 23)

Personnel Required

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References

WP 0077, Remove/Install Starter

Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool
 Harmonic balancer removed (WP 0094, Remove/Install Harmonic Balancer)
 Water pump and pulley removed (WP 0074, Remove/Install Water Pump)
 Speed control plate removed and start spring disconnected (WP 0070, Remove/Install Speed Control Plate)
 Governor actuator removed (WP 0078, Remove/Install Governor Actuator)
 Oil pan removed (WP 0084, Remove/Install Oil Pan and Strainer)
 Oil filter removed (WP 0066, Service Lubrication System)

REMOVE/INSTALL GEAR CASE COVER
Remove Gear Case Cover

1. Ensure equipment conditions are met in order presented in initial setup.

REMOVE/INSTALL GEAR CASE COVER – CONTINUED

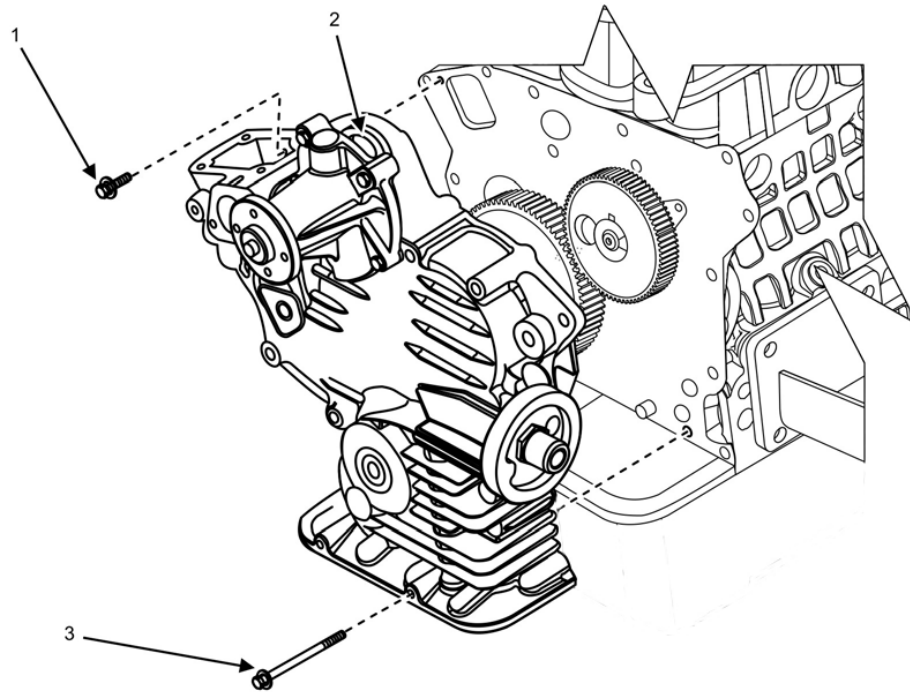


Figure 1. Gear Case Cover - Detail.

2. Remove starter mounting bolt from gear case cover (WP 0077, Remove/Install Starter).
3. Remove and discard gear case bolt with captive lockwasher (Figure 1, Item 1) from beneath speed plate.
4. Loosen 13 bolts with captive lockwashers (Figure 1, Item 3) on gear case cover (Figure 1, Item 2).
5. Remove and discard 13 bolts with captive lockwashers (Figure 1, Item 3) from gear case cover (Figure 1, Item 2).

NOTE

It may be necessary to tap the gear case cover (Figure 1, Item 2) lightly with a rubber mallet to loosen.

6. Remove gear case cover (Figure 1, Item 2) and place on suitable work surface.

NOTE

The oil filter pipe joint (Figure 2, Item 5) and washer (Figure 2, Item 6) hold valve seat (Figure 2, Item 3), spring (Figure 2, Item 1), and ball (Figure 2, Item 2) in place. Care should be taken not to lose any of these parts when removing pipe joint and washer.

7. Remove oil filter pipe joint (Figure 2, Item 5) and washer (Figure 2, Item 6) from old gear case cover and set aside for reuse.

REMOVE/INSTALL GEAR CASE COVER – CONTINUED

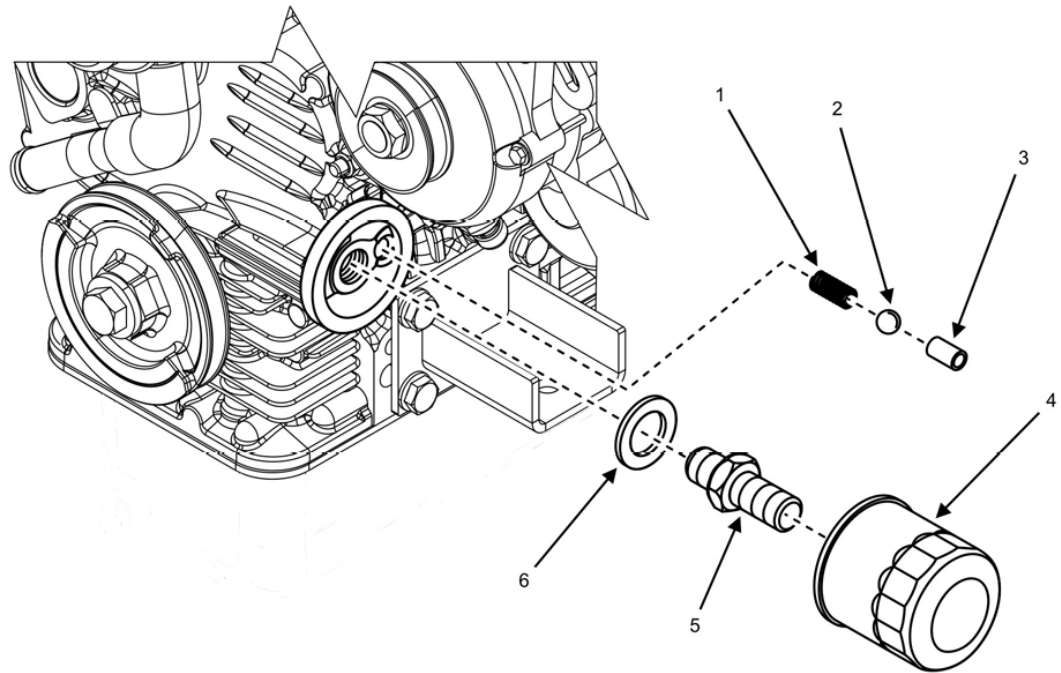


Figure 2. Remove Oil Filter and Mounting Hardware.

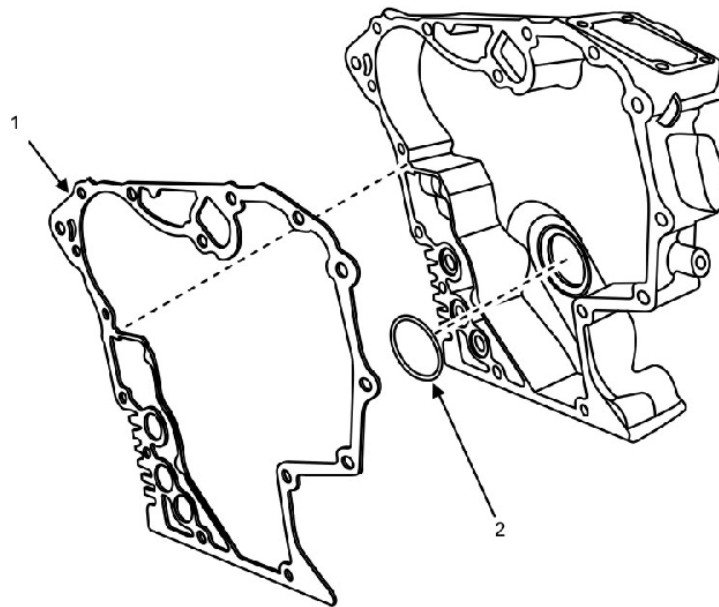


Figure 3. Gear Case Cover Detail - Rear.

8. Remove valve seat (Figure 2, Item 3), ball (Figure 2, Item 2), and spring (Figure 2, Item 1) from behind washer (Figure 2, Item 6) and set aside for reuse.

REMOVE/INSTALL GEAR CASE COVER – CONTINUED

9. Remove and discard gear case cover gasket (Figure 3, Item 1).
10. Remove and discard oil seal (Figure 3, Item 2) from gear case cover (Figure 1, Item 2).

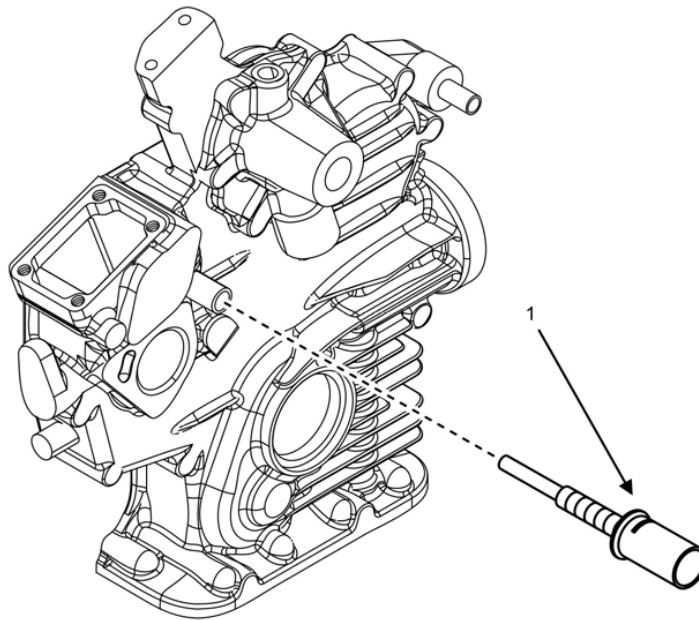


Figure 4. Remove Idle Apparatus.

11. Remove idle apparatus (Figure 4, Item 1) from gear case cover (Figure 1, Item 2) and set aside for reuse.

END OF TASK**Inspect Gear Case Cover**

1. Inspect gear case cover (Figure 1, Item 2) for signs of obvious damage. Replace as required.
2. Remove stud holding metal water pipe to gear case cover (Figure 1, Item 2) if cover is being replaced and set aside for reuse.
3. Remove any dirt, debris, or residual gasket material from gear case cover (Figure 1, Item 2) mounting surface or on cylinder block.

END OF TASK**Install Gear Case Cover**

1. Install idle apparatus (Figure 4, Items 1) to gear case cover.
2. Place valve seat (Figure 2, Item 3), ball (Figure 2, Item 2), and spring (Figure 2, Item 1) onto oil filter mounting location on gear case cover (Figure 1, Item 2).
3. Install washer (Figure 2, Item 6) and oil filter pipe joint (Figure 2, Item 5) onto new gear case cover (Figure 1, Item 2).
4. Install new oil seal (Figure 3, Item 2) into crankshaft opening of gear case cover (Figure 1, Item 2).
5. Apply sealing compound (liquid gasket) to gear case cover (Figure 1, Item 2) mating surface.

REMOVE/INSTALL GEAR CASE COVER – CONTINUED

6. Position gear case cover gasket (Figure 3, Item 1) to its mounting location on gear case.
7. Position gear case cover (Figure 1, Item 2) to its mounting location over gear case cover gasket (Figure 3, Item 1) on gear case.

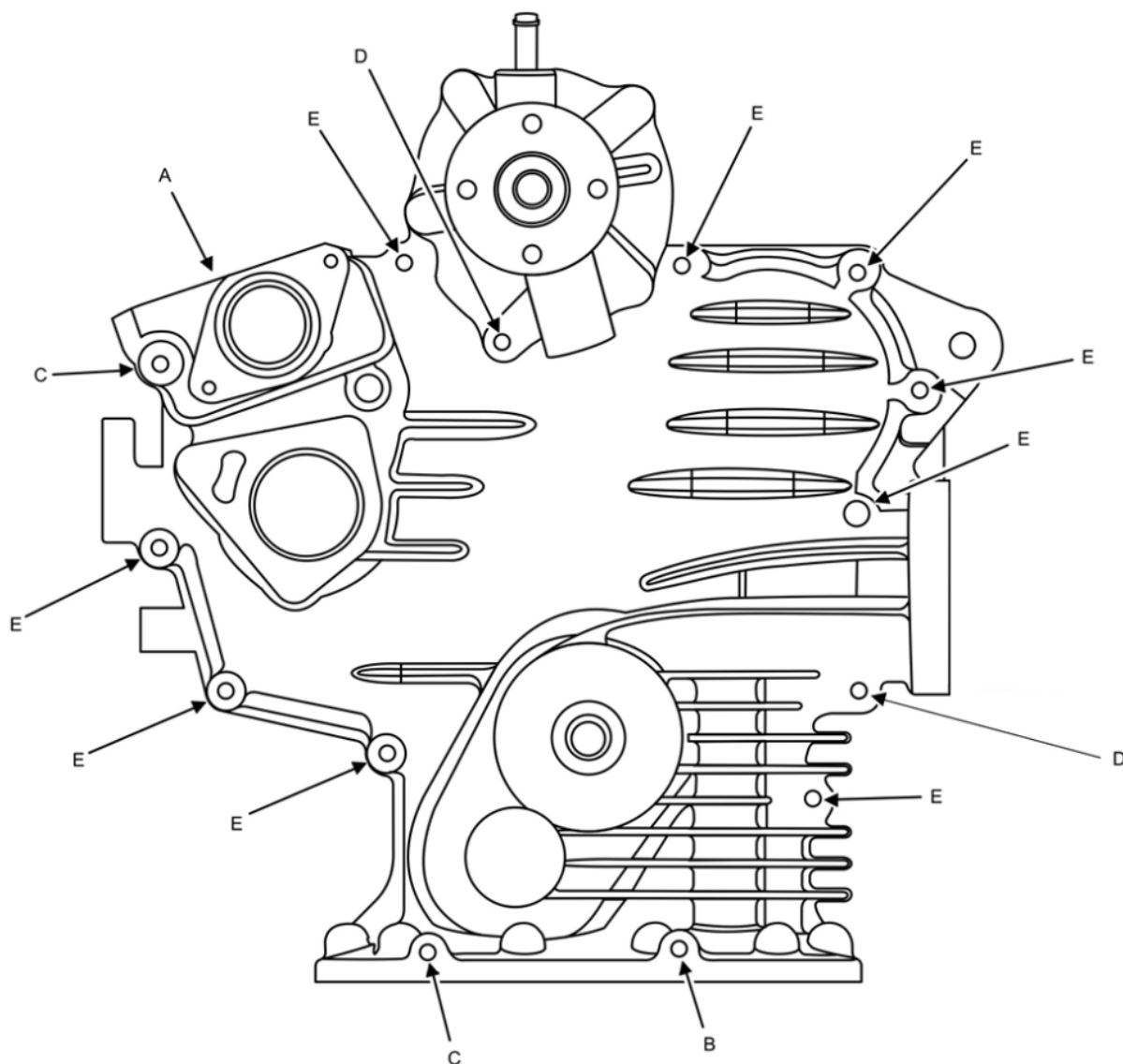


Figure 5. Mounting Bolts Location - Length Detail.

CAUTION

Be sure to install bolts into gear case according to lengths as shown in Figure 5 and the accompanying table. Failure to comply may cause damage to equipment.

8. Install gear case bolt with captive lockwasher (Figure 5, Item A).
9. Install 13 new bolts with captive lockwashers (Figure 1, Item 3) according to location and length detailed in Figure 5 and Table 1. Tighten finger-tight.

REMOVE/INSTALL GEAR CASE COVER – CONTINUED**Table 1. Mounting Bolt Length.**

GROUP	LENGTH IN MM	LENGTH IN INCHES	QUANTITY
A	19.05 mm	0.75 in	1
B	88.90 mm	3.50 in	1
C	82.55 mm	3.25 in	2
D	63.50 mm	2.50 in	2
E	50.80 mm	2.00 in	9

10. Tighten all gear case cover bolts with captive lockwashers (Figure 5, Items B through E). Torque bolts to 7-8 ft•lb (10-11 N•m).
11. Install new oil filter (Figure 2, Item 4) (WP 0068, Service Lubrication System).
12. Install starter to gear case cover using mounting bolt (WP 0077, Remove/Install Starter).
13. Install oil pan (WP 0084, Remove/Install Oil Pan and Strainer).
14. Install governor actuator (WP 0078, Remove/Install Governor Actuator).
15. Install speed control plate (WP 0070, Remove/Install Speed Control Plate).
16. Install water pump and pulley (WP 0074, Remove/Install Water Pump).
17. Install harmonic balancer (WP 0094, Remove/Install Harmonic Balancer).
18. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
19. Start engine and check for proper operation (TM 9-6115-749-10).
20. Repair as required.

END OF TASK**END OF WORK PACKAGE**

SUSTAINMENT MAINTENANCE

REPLACE CYLINDER HEAD GASKET

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's (GMTK) (WP 0162, Table 2, Item 33)
 Wrench, Torque, Click, Ratcheting, 3/8 in Drive, 75 ft•lb (WP 0162, Table 2, Item 41)

Personnel Required

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Equipment Condition

Engine control switch OFF (TM 9-6115-749-10, WP 0005)
 Engine cool
 Battery-Charging alternator assembly removed (WP 0075, Remove/Install Battery-Charging Alternator Assembly)
 Intake manifold removed (WP 0079, Remove/Install Intake Manifold)
 Exhaust manifold removed (WP 0080, Remove/Install Exhaust Manifold)
 Valve cover removed (WP 0082, Remove/Install Valve Cover)
 Fuel injectors and lines removed (WP 0069, Remove/Install Fuel Injector)
 Glow plug contact strip removed (WP 0068, Remove/Install Valve Cover)
 Water pump hose removed (WP 0074, Remove/Install Water Pump)

Materials/Parts

Assembly, cylinder head (1) (WP 0140, Item 1)
 Bolt (5) (WP 0135, Item 4)
 Bolt, cylinder head (14) (WP 0140, Item 8)
 Gasket (3) (WP 0127, Item 10)
 Gasket, cylinder head (1) (WP 0140, Item 10)
 Gasket, intake manifold (1) (WP 0135, Item 3)
 Gasket, valve cover (1) (WP 0141, Item 11)
 Grease, electrically conductive (WP 0163, Table 1, Item 20)
 Lubricating oil, engine (WP 0163, Table 1, Item 23)
 Pan, drain (WP 0163, Table 1, Item 28)
 Penetrating oil (WP 0163, Table 1, Item 29)
 Rag, wiping (WP 0163, Table 1, Item 31)

REPLACE CYLINDER HEAD GASKET**Replace Cylinder Head Gasket**

1. Ensure equipment conditions are met in order presented in initial setup.
2. Apply penetrating oil to all cylinder head bolts (Figure 2, Item 2).

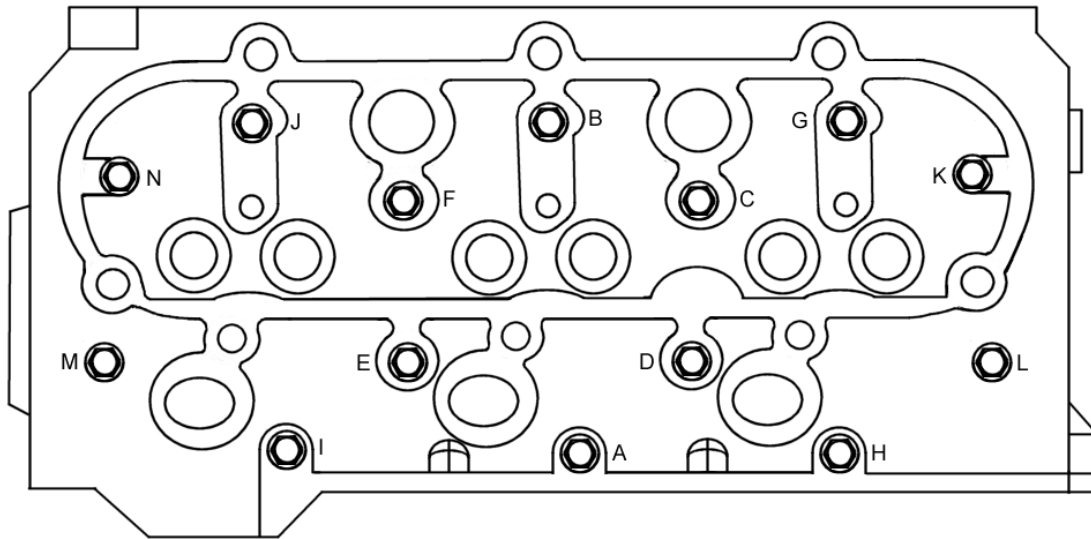
REPLACE CYLINDER HEAD GASKET – CONTINUED

Figure 1. Cylinder Head Bolt Sequence.

CAUTION

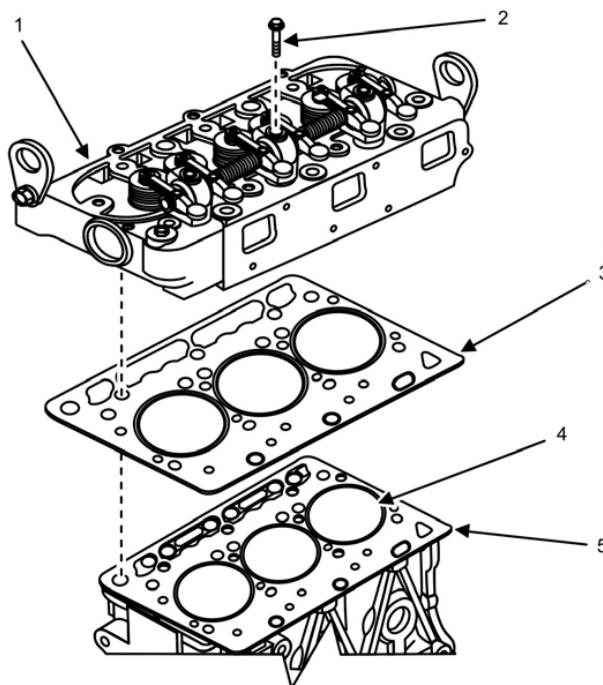
To prevent warping of the cylinder head (Figure 2, Item 1), loosen cylinder head bolts (Figure 2, Item 2) in the specific order instructed in Figure 1. Failure to comply may cause damage to equipment.

CAUTION

The cylinder head bolts (Figure 2, Item 2) in locations H and L (Figure 1) are longer than the other cylinder head bolts (Figure 2, Item 2). These longer cylinder head bolts (Figure 2, Item 2) must be placed in locations H and L when installing the cylinder head (Figure 2, Item 1). Failure to comply may cause damage to equipment.

3. Loosen cylinder head bolts (Figure 2, Item 2) in reverse alphabetical order from N to A, as shown in Figure 1.

REPLACE CYLINDER HEAD GASKET – CONTINUED

**Figure 2. Remove/Install Cylinder Head - Detail.**

4. Remove and discard cylinder head bolts (Figure 2, Item 2) from cylinder head (Figure 2, Item 1).

NOTE

It may be necessary to tap the cylinder head (Figure 2, Item 1) using a rubber mallet to loosen it from the engine block.

5. Remove cylinder head (Figure 2, Item 1) from engine block (Figure 2, Item 5).
6. Place cylinder head (Figure 2, Item 1) on a suitable work surface.
7. Cover cylinder bores (Figure 2, Item 4) to prevent dirt and debris from entering engine block (Figure 2, Item 5).
8. Remove and discard cylinder head gasket (Figure 2, Item 3).
9. Inspect cylinder head (Figure 2, Item 1) for cracks or damage.

NOTE

When replacing a cylinder head (Figure 2, Item 1) assembly, be sure to remove the lifting eyes and bolts from the damaged cylinder head assembly and install them on the new cylinder head assembly.

10. Notify supervisor if replacement of cylinder head (Figure 2, Item 1) is necessary.

REPLACE CYLINDER HEAD GASKET – CONTINUED**NOTE**

When installing cylinder head gasket (Figure 2, Item 3), the metal flashing of the cylinder head gasket (Figure 2, Item 3) must face toward the cylinder head (Figure 2, Item 1).

11. Position new cylinder head gasket (Figure 2, Item 3) to its mounting location on engine block (Figure 2, Item 5) and align mounting holes.
12. Place cylinder head (Figure 2, Item 1) to its mounting location on new cylinder head gasket (Figure 2, Item 3).
13. Prior to installation, apply engine lubricating oil to new cylinder head bolts (Figure 2, Item 2).
14. Install new cylinder head bolts (Figure 2, Item 2) to positions A through N, as shown in Figure 1. Finger-tighten.

CAUTION

To prevent warping of the cylinder head (Figure 2, Item 1), install and torque the cylinder head bolts (Figure 2, Item 2) in the specific order instructed in Figure 1. Failure to comply may cause damage to equipment.

CAUTION

The cylinder head bolts (Figure 2, Item 2) in locations H and L (Figure 1) are longer than the other cylinder head bolts (Figure 2, Item 2). These longer cylinder head bolts (Figure 2, Item 2) must be used in locations H and L when installing the cylinder head (Figure 2, Item 1). Failure to comply may cause damage to equipment.

15. Secure cylinder head bolts (Figure 2, Item 2) in alphabetical order from A to N, as shown in Figure 1. Torque bolts to 28-31 ft•lb (37-42 N•m).
16. Install water pump hose (WP 0074, Remove/Install Water Pump).
17. Install glow plug contact strip (WP 0068, Remove/Install Glow Plugs).
18. Install fuel injectors and lines (WP 0069, Remove/Install Fuel Injector).
19. Install valve cover (WP 0082, Remove/Install Valve Cover).
20. Install exhaust manifold (WP 0080, Remove/Install Exhaust Manifold).
21. Install intake manifold (WP 0079, Remove/Install Intake Manifold).
22. Install battery-charging alternator assembly (WP 0075, Remove/Install Battery-Charging Alternator).
23. Set engine control switch to PRIME & RUN (TM 9-6115-749-10).
24. Start engine and check for proper operation (TM 9-6115-749-10). Bring coolant to normal operating temperature and then apply a 100% rated load for 30 min (TM 9-6115-749-10).
25. Repair as required.

END OF TASK**END OF WORK PACKAGE**

SUSTAINMENT MAINTENANCE**WIRING DIAGRAMS**

INITIAL SETUP:**Personnel Required**

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References

FO-1, Wiring Diagram

FO-2, Schematic Diagram

INTRODUCTION

All diagrams and essential wiring information are provided for all electrical circuits with the exception of the DCS.

WIRE IDENTIFICATION

Identification of wires is done in the FO-1, Wiring Diagram and FO-2, Schematic Diagram in the Rear Matter of this manual.

ABBREVIATIONS

Abbreviations in the wiring information conform to ASME Y14.38 unless the wires are marked as shown in the respective diagrams.

WIRING DIAGRAMS

Wiring schematics and diagrams are provided in FO-1, Wiring Diagram and FO-2, Schematic Diagram located in the Rear Matter of this manual.

END OF WORK PACKAGE

CHAPTER 6

FIELD AND SUSTAINMENT PARTS INFORMATION

FIELD AND SUSTAINMENT MAINTENANCE

INTRODUCTION

INTRODUCTION

SCOPE

This RPSTL lists and authorizes spares and repair parts; special tools; special test, measurement, and diagnostic equipment (TMDE); and other special support equipment required for performance of field and sustainment maintenance of the AMMPS 5 kW generator set. It authorizes the requisitioning, issue, and disposition of spares, repair parts, and special tools as indicated by the source, maintenance, and recoverability (SMR) codes.

GENERAL

In addition to the Introduction work package, this RPSTL is divided into the following work packages.

1. **Repair Parts List Work Packages.** Work packages containing lists of spares and repair parts authorized by this RPSTL for use in the performance of maintenance. These work packages also include parts which must be removed for replacement of the authorized parts. Parts lists are composed of functional groups in ascending alphanumeric sequence, with the parts in each group listed in ascending figure and item number sequence. Sending units, brackets, filters, and bolts are listed with the component they mount on. Bulk materials are listed by item name in FIG. BULK at the end of the work packages. Repair parts kits are listed separately in their own functional group and work package. Repair parts for reparable special tools are also listed in a separate work package. Items listed are shown on the associated illustrations.
2. **Special Tools List Work Packages.** Work packages containing lists of special tools, special TMDE, and special support equipment authorized by this RPSTL (as indicated by Basis of Issue (BOI) information in the DESCRIPTION AND USABLE ON CODE (UOC) column). Tools that are components of common tool sets and/or Class VII are not listed.
3. **Cross-Reference Indexes Work Packages.** There are two cross-reference indexes work packages in this RPSTL: the National Stock Number (NSN) Index work package and the Part Number (P/N) Index work package. The National Stock Number Index work package refers you to the figure and item number. The Part Number Index work package refers you to the figure and item number.

EXPLANATION OF COLUMNS IN THE REPAIR PARTS LIST AND SPECIAL TOOLS LIST WORK PACKAGES

ITEM NO. (Column (1)). Indicates the number used to identify items called out in the illustration.

SMR CODE (Column (2)). The SMR code containing supply/requisitioning information, maintenance level authorization criteria, and disposition instruction, as shown in the following breakout. This entry may be subdivided into 4 subentries, one for each service.

Table 1. SMR Code Explanation.

SOURCE		MAINTENANCE		RECOVERABILITY	
CODE		CODE		CODE	
XX		XX		X	
1st two positions:	3rd position:	4th position:	5th position:		
How to get an item.	Who can install, replace, or use the item.	Who can do complete repair* on the item	Who determines disposition action on unserviceable items.		

*Complete Repair: Maintenance capacity, capability, and authority to perform all corrective maintenance tasks of the "Repair" function in a use/user environment in order to restore serviceability to a failed item.

INTRODUCTION – CONTINUED

Source Code. The source code tells you how you get an item needed for maintenance, repair, or overhaul of an end item/equipment. Explanations of source codes follow:

SOURCE CODE	APPLICATION/EXPLANATION
PA	
PB	
PC	
PD	
PE	
PF	
PG	
PH	
PR	
PZ	
KD	
KF	
KB	
MF-Made at field	
MH-Made at below depot/sustainment level	
ML-Made at SRA	
MD-Made at depot	
MG-Navy only	
AF-Assembled by field	
AH-Assembled by below depot sustainment level	
AL-Assembled by SRA	
AD-Assembled by depot	
AG-Navy only	
XA	
XB	
XC	
XD	

NOTE

Items coded PC are subject to deterioration.

Stock items; use the applicable NSN to requisition/request items with these source codes. They are authorized to the level indicated by the code entered in the third position of the SMR code.

Items with these codes are not to be requested/requisitioned individually. They are part of a kit which is authorized to the maintenance level indicated in the third position of the SMR code. The complete kit must be requisitioned and applied.

Items with these codes are not to be requisitioned/requested individually. They must be made from bulk material which is identified by the part number in the DESCRIPTION AND USABLE ON CODE (UOC) column and listed in the bulk material group work package of the RPSTL. If the item is authorized to you by the third position code of the SMR code, but the source code indicates it is made at higher level, order the item from the higher level of maintenance.

Items with these codes are not to be requested/requisitioned individually. The parts that make up the assembled item must be requisitioned or fabricated and assembled at the level of maintenance indicated by the source code. If the third position of the SMR code authorizes you to replace the item, but the source code indicates the item is assembled at a higher level, order the item from the higher level of maintenance.

Do not requisition an "XA" coded item. Order the next higher assembly. (Refer to NOTE below.)

If an item is not available from salvage, order it using the CAGEC and part number.

Installation drawings, diagrams, instruction sheets, field service drawings; identified by manufacturer's part number.

Item is not stocked. Order an XD-coded item through local purchase or normal supply channels using the CAGEC and part number given, if no NSN is available.

INTRODUCTION – CONTINUED**NOTE**

Cannibalization or controlled exchange, when authorized, may be used as a source of supply for items with the above source codes except for those items source coded "XA" or those aircraft support items restricted by requirements of AR 750-1.

Maintenance Code. Maintenance codes tell you the level(s) of maintenance authorized to use and repair support items. The maintenance codes are entered in the third and fourth positions of the SMR code as follows:

Third Position. The maintenance code entered in the third position tells you the lowest maintenance level authorized to remove, replace, and use an item. The maintenance code entered in the third position will indicate authorization to the following levels of maintenance:

MAINTENANCE CODE	APPLICATION/EXPLANATION
C -	Crew.
F -	Field maintenance can remove, replace, and use the item.
H -	Below Depot Sustainment maintenance can remove, replace, and use the item.
L -	Specialized repair activity can remove, replace, and use the item.
G -	Afloat and ashore intermediate maintenance can remove, replace, and use the item (Navy only)
K -	Contractor facility can remove, replace, and use the item
Z -	Item is not authorized to be removed, replace, or used at any maintenance level
D -	Depot can remove, replace, and use the item

NOTE

Army will use C in the third position. However, for joint service publications, other services may use O.

Fourth Position. The maintenance code entered in the fourth position tells you whether or not the item is to be repaired and identifies the lowest maintenance level with the capability to do complete repair (perform all authorized repair functions).

NOTE

Some limited repair may be done on the item at a lower level of maintenance, if authorized by the Maintenance Allocation Chart (MAC) and SMR codes.

MAINTENANCE CODE	APPLICATION/EXPLANATION
C -	Crew (operator) is the lowest class that can do complete repair.
F -	Field is the lowest level that can do complete repair of the item.
H -	Below Depot Sustainment is the lowest level that can do complete repair of the item.
L -	Specialized repair activity (enter specialized repair activity or TASMG designator) is the lowest level that can do complete repair of the item.
D -	Depot is the lowest level that can do complete repair of the item.
G -	Both afloat and ashore intermediate levels are capable of complete repair of item. (Navy only)

INTRODUCTION – CONTINUED

MAINTENANCE CODE	APPLICATION/EXPLANATION
K -	Complete repair is done at contractor facility
Z -	Nonreparable. No repair is authorized.
B -	No repair is authorized. No parts or special tools are authorized for maintenance of "B" coded item. However, the item may be reconditioned by adjusting, lubricating, etc., at the user level.

Recoverability Code. Recoverability codes are assigned to items to indicate the disposition action on unserviceable items. The recoverability code is shown in the fifth position of the SMR code as follows:

RECOVERABILITY CODE	APPLICATION/EXPLANATION
Z -	Nonreparable item. When unserviceable, condemn and dispose of the item at the level of maintenance shown in the third position of the SMR code.
F -	Reparable item. When uneconomically reparable, condemn and dispose of the item at the field level.
H -	Reparable item. When uneconomically reparable, condemn and dispose of the item at the below depot sustainment level.
D -	Reparable item. When beyond lower level repair capability, return to depot. Condemnation and disposal of item are not authorized below depot level.
L -	Reparable item. Condemnation and disposal not authorized below Specialized Repair Activity (SRA).
A -	Item requires special handling or condemnation procedures because of specific reasons (such as precious metal content, high dollar value, critical material, or hazardous material). Refer to appropriate manuals/directives for specific instructions.
G -	Filed level reparable item. Condemn and dispose at either afloat or ashore intermediate levels. (Navy only)
K -	Reparable item. Condemnation and disposal to be performed at contractor facility

NSN (Column (3)). The NSN for the item is listed in this column.

CAGEC (Column (4)). The Commercial and Government Entity Code (CAGEC) is a five-digit code which is used to identify the manufacturer, distributor, or Government agency/activity that supplies the item.

PART NUMBER (Column (5)). Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items.

NOTE

When you use an NSN to requisition an item, the item you receive may have a different part number from the number listed.

DESCRIPTION AND USABLE ON CODE (UOC) (Column (6)). This column includes the following information:

1. The federal item name, and when required, a minimum description to identify the item.
2. Part numbers of bulk materials are referenced in this column in the line entry to be manufactured or fabricated.

INTRODUCTION – CONTINUED

3. Hardness Critical Item (HCI). A support item that provides the equipment with special protection from electromagnetic pulse (EMP) damage during a nuclear attack.
4. The statement END OF FIGURE appears just below the last item description in column (6) for a given figure in both the repair parts list and special tools list work packages.

QTY (Column (7)). The QTY (quantity per figure) column indicates the quantity of the item used in the breakout shown on the illustration/figure, which is prepared for a functional group, subfunctional group, or an assembly. A "V" appearing in this column instead of a quantity indicates that the quantity is variable and quantity may change from application to application.

EXPLANATION OF CROSS-REFERENCE INDEXES WORK PACKAGES FORMAT AND COLUMNS

1. National Stock Number (NSN) Index Work Package. NSN's in this index are listed in National Item Identification Number (NIIN) sequence.
 STOCK NUMBER Column. This column lists the NSN in NIIN sequence. The NIIN consists of the last nine digits of the NSN. When using this column to locate an item, ignore the first four digits of the NSN. However, the complete NSN should be used when ordering items by stock number.
 For example, if the NSN is 5385-01-574-1476, the NIIN is 01-574-1476.
 FIG. Column. This column lists the number of the figure where the item is identified/located. The figures are in numerical order in the repair parts list and special tools list work packages.
 ITEM Column. The item number identifies the item associated with the figure listed in the adjacent FIG. column. This item is also identified by the NSN listed on the same line.
2. Part Number (P/N) Index Work Package. Part numbers in this index are listed in ascending alphanumeric sequence (vertical arrangement of letter and number combinations which places the first letter or digit of each group in order A through Z, followed by the numbers 0 through 9 and each following letter or digit in like order).
 PART NUMBER Column. Indicates the part number assigned to the item.
 FIG. Column. This column lists the number of the figure where the item is identified/located in the repair parts list and special tools list work packages.
 ITEM Column. The item number is the number assigned to the item as it appears in the figure referenced in the adjacent figure number column.

SPECIAL INFORMATION

UOC. The UOC appears in the lower left corner of the Description Column heading. Usable on codes are shown as "UOC:..." in the Description Column (justified left) on the first line under the applicable item/nomenclature. Uncoded items are applicable to all models. Identification of the UOCs used in the RPSTL are:

CODE	USED ON
98E	Model MEP 1030
98F	Model MEP 1031

Fabrication Instructions. Bulk materials required to manufacture items are listed in the bulk material functional group of this RPSTL. Part numbers for bulk material are also referenced in the Description Column of the line item entry for the item to be manufactured/fabricated.

Index Numbers. Items which have the word BULK in the figure column will have an index number shown in the item number column. This index number is a cross-reference between the NSN / Part Number (P/N) Index work packages and the bulk material list in the repair parts list work package.

INTRODUCTION – CONTINUED

Illustrations List. The illustrations in this RPSTL contain field authorized items. The tabular list in the repair parts list work package contains only those parts coded "F" in the third position of the SMR code, therefore, there may be a break in the item number sequence.

HOW TO LOCATE REPAIR PARTS

1. When NSNs or Part Numbers Are Not Known

First. Using the table of contents, determine the assembly group to which the item belongs. This is necessary since figures are prepared for assembly groups and subassembly groups, and lists are divided into the same groups.

Second. Find the figure covering the functional group or the subfunctional group to which the item belongs.

Third. Identify the item on the figure and note the number(s).

Fourth. Look in the repair parts list work packages for the figure and item numbers. The NSNs and part numbers are on the same line as the associated item numbers.

2. When NSN is Known

First. If you have the NSN, look in the STOCK NUMBER column of the NSN index work package. The NSN is arranged in NIIN sequence. Note the figure and item number next to the NSN.

Second. Turn to the figure and locate the item number. Verify that the item is the one you are looking for.

3. When Part Number Is Known

First. If you have the part number and not the NSN, look in the PART NUMBER column of the part number index work package. Identify the figure and item number.

Second. Look up the item on the figure in the applicable repair parts list work package.

ABBREVIATIONS

Not applicable.

END OF WORK PACKAGE

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 00 GENERATOR SET REPAIR PARTS LIST

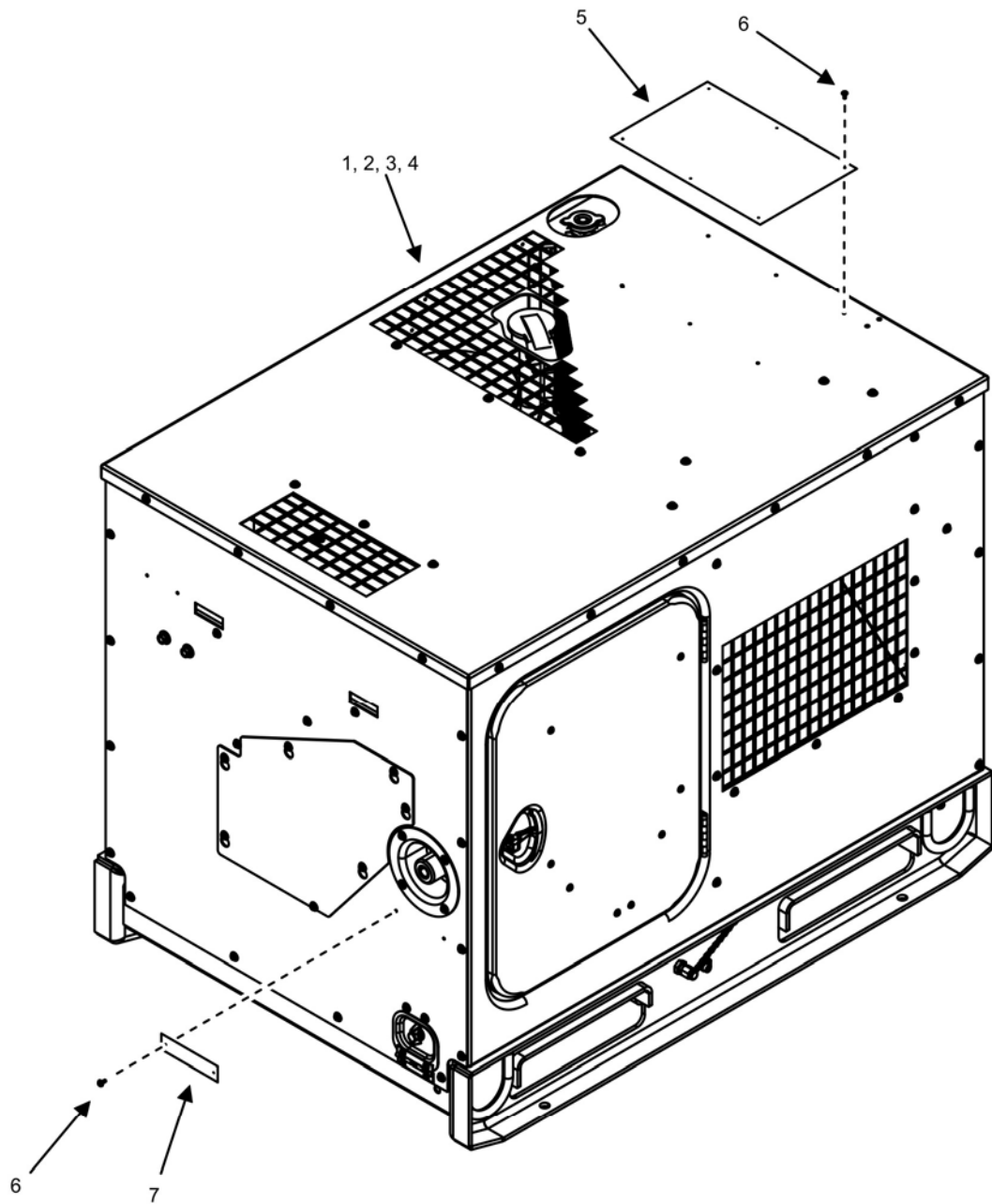


Figure 1. Generator Set (Sheet 1 of 6).

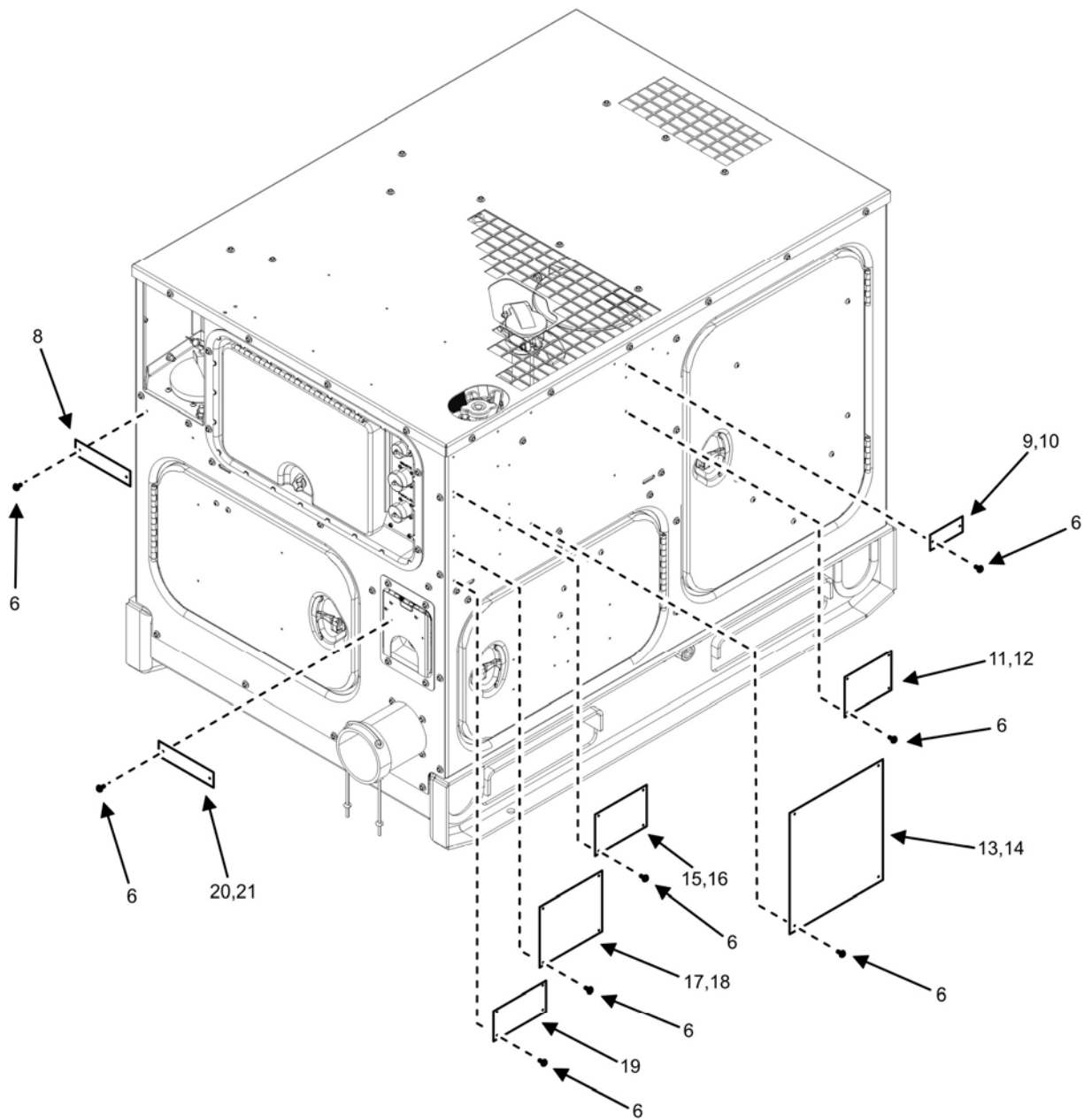


Figure 1. Generator Set (Sheet 2 of 6).

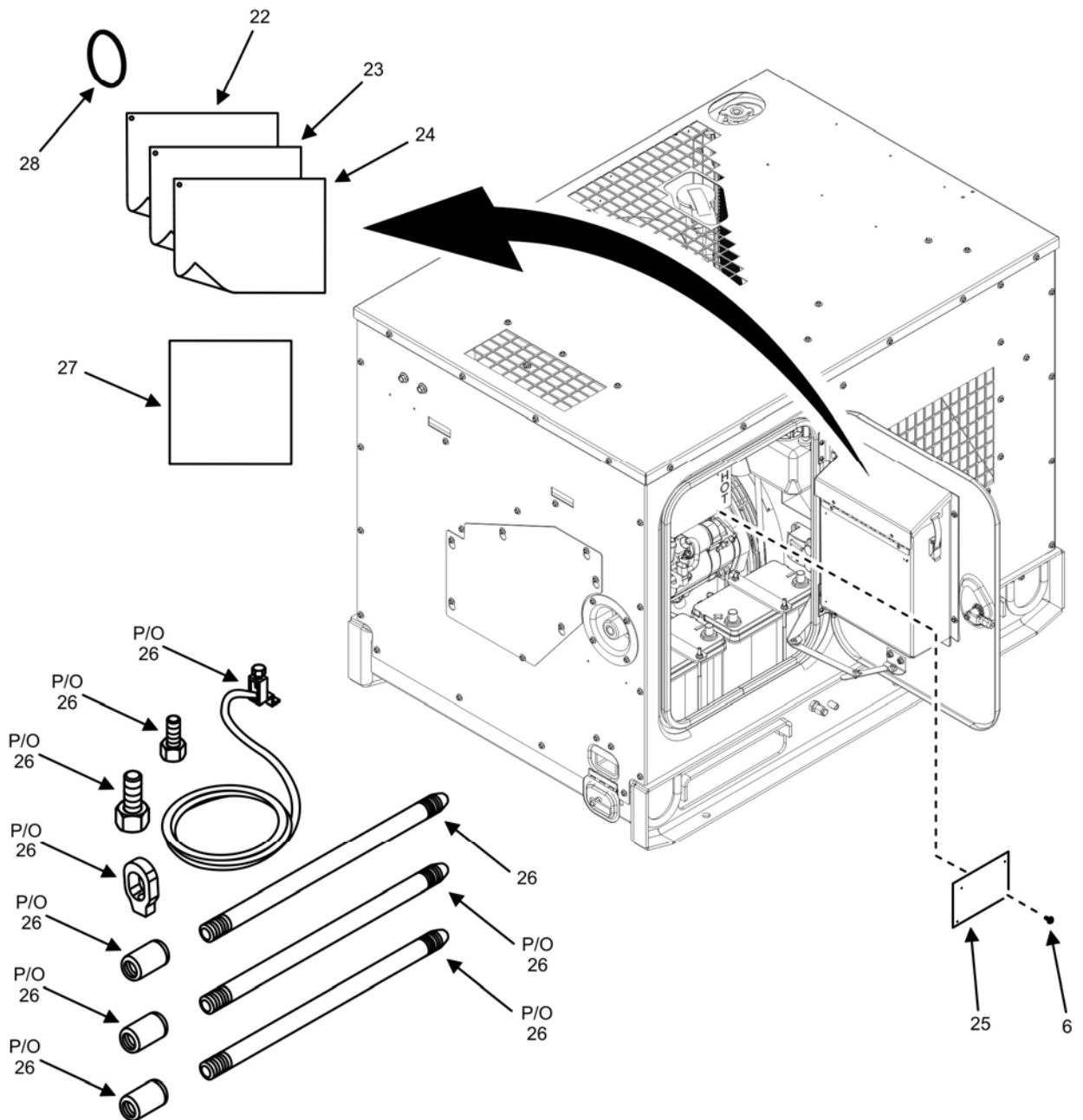


Figure 1. Generator Set (Sheet 3 of 6).

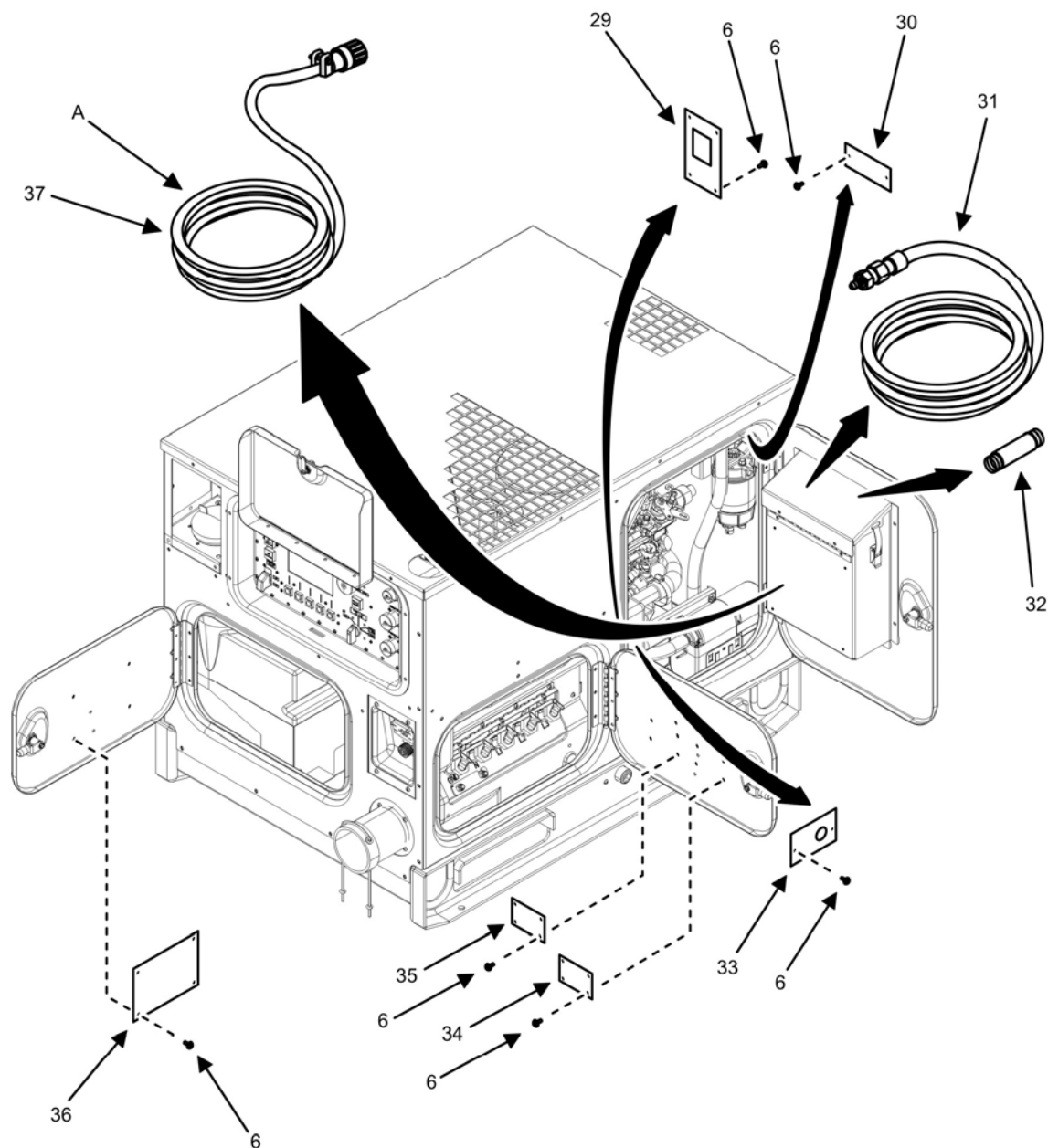


Figure 1. Generator Set (Sheet 4 of 6).

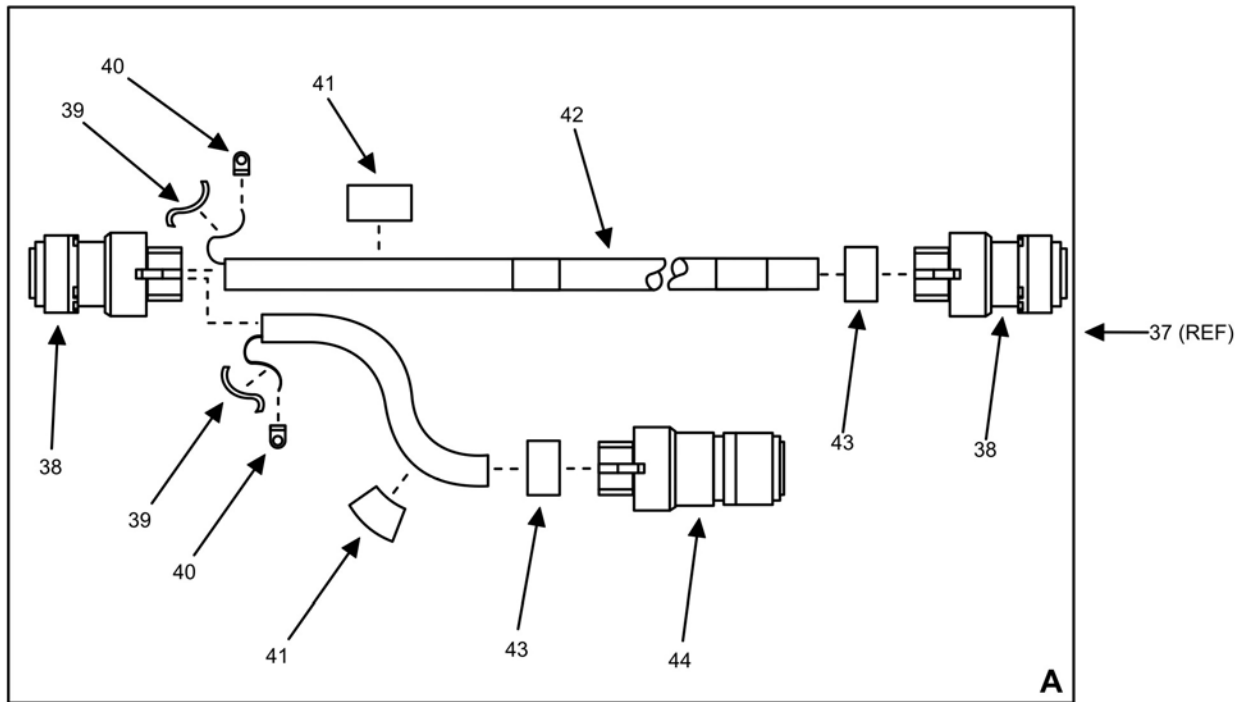


Figure 1. Generator Set (Sheet 5 of 6).

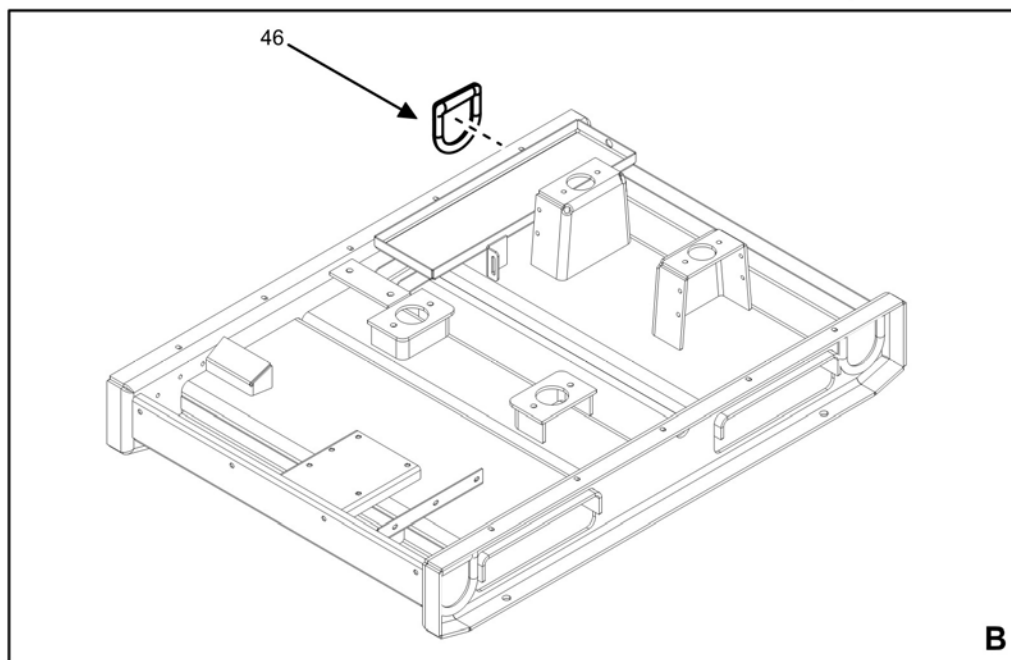
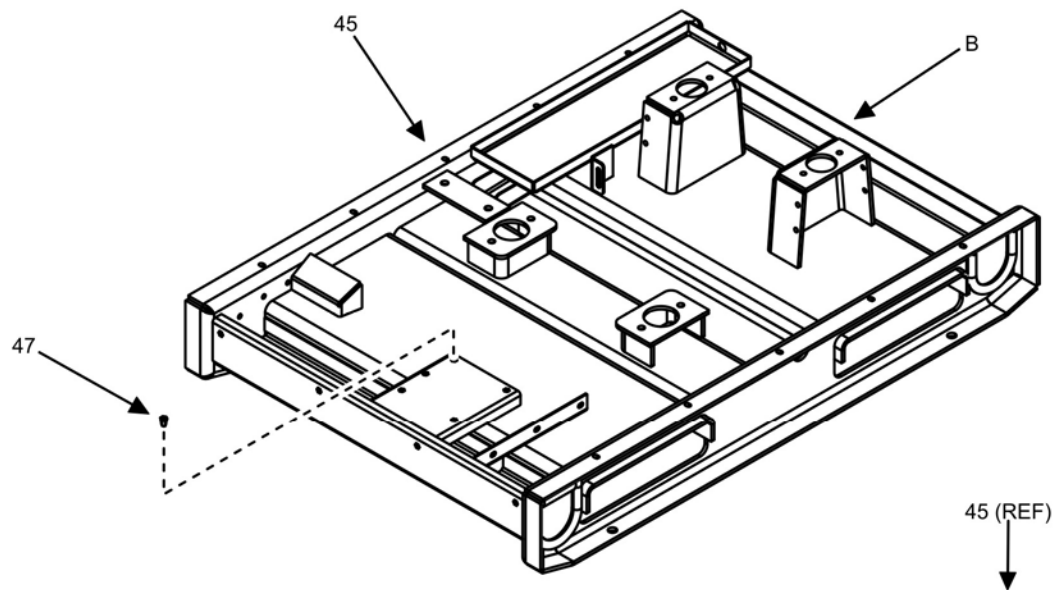


Figure 1. Generator Set (Sheet 6 of 6).

(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 00 GENERATOR SET									
FIGURE 1 GENERATOR SET									
1	PAFHH	PAFHH	PAFFF	PAFFF	6115-01-561-7329	30554	04-1030	GENERATOR SET, DIESEL UOC: 98E	1
2	PAFHH	PAFHH	PAFFF	PAFFF	6115-01-561-7438	30554	04-1031	GENERATOR SET, DIESEL UOC: 98F	1
3	XAFHH	XAFHH	XBFFF	XBFFF		30554	04-21130	. GENERATOR ASSEMBLY UOC: 98E	1
4	XAFHH	XAFHH	XBFFF	XBFFF		30554	04-21131	. GENERATOR ASSEMBLY UOC: 98F	1
5	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21026	. PLATE, OPERATING INSTRUCTIONS .	1
6	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5320-00-932-1972	81349	M24243/6-A 402H	. RIVET, BLIND	66
7	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	88-20075	. PLATE, SLAVE, RECEPTACLE	1
8	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21236	. PLATE, FUEL	1
9	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21078-1	. PLATE, UID IDENTIFICATION UOC: 98E	1
10	XBFZZ	XBFZZ	XBFZZ	XBFZZ	4720-01-596-5240	30554	04-21078-2	. PLATE, UID IDENTIFICATION UOC: 98F	1
11	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21077-1	. PLATE, IDENTIFICATION, GENERA- TOR SET UOC: 98E	1
12	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21077-2	. PLATE, IDENTIFICATION, GENERA- TOR SET UOC: 98F	1
13	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21023-1	. PLATE, LIFTING AND TIE DOWN UOC: 98E	1
14	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21023-2	. PLATE, LIFTING AND TIE DOWN UOC: 98F	1
15	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21024-1	. PLATE, IDENTIFICATION, OTAN UOC: 98E	1
16	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21024-2	. PLATE, IDENTIFICATION, OTAN UOC: 98F	1
17	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21022-1	. PLATE, SET RATING UOC: 98E	1
18	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21022-2	. PLATE, SET RATING UOC: 98F	1

(1) ITEM NO.	(2) SMR CODE				(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
19	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21011-1	. PLATE, SYSTEM CAPACITY	1
20	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21237	. PLATE, PARALLELING, RECEPTACLE UOC: 98E	1
21	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21240	. PLATE, PARALLELING, RECEPTACLE UOC: 98F	1
22	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	98-19694	. LAMINATE, WIRING DIAGRAM 5KW, 50/60/400 HZ	1
23	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20000-2	. LAMINATE, WIRING DIAGRAM 5KW, 50/60/400 HZ	1
24	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20000-3	. LAMINATE, WIRING DIAGRAM 5KW, 50/60/400 HZ	1
25	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21025	. PLATE, BATTERY CONNECTION	1
26	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5975-00-878-3791	58536	AA55804-3B 9FT	. ROD, GROUND	1
27	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21348	. PLATE, WIRING DIAGRAM	1
28	PAFZZ	PAFZZ	PAFZZ	PAFZZ		30554	98-19694	. BOOK RING	1
29	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21106	. PLATE, INFORMATION	1
30	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21016	. PLATE, FIRST FUEL FILTER	1
31	PCFZZ	PCFZZ	PCFZZ	PCFZZ	4720-00-021-3320	01276	69-668	. HOSE ASSEMBLY, FUEL	1
32	PAFZZ	PAFZZ	PAFZZ	PAFZZ		39428	9176K155	. NIPPLE, PIPE	1
33	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	88-21776	. PLATE, DEAD CRANK	1
34	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	88-20110	. PLATE, CAUTION, VOLTAGE	1
35	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21475-1	. PLATE, GROUNDING STUD	1
36	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21017-1	. PLATE, INFORMATION, FUEL	1
37	PAFFF	PAFFF	PAFFF	PAFFF	6150-01-586-0026	30554	04-21228	. HARNESS, CONTROL	1
38	XBFZZ	XBFZZ	XBFZZ	XBFZZ		0PCR1	CD3106E18 -19P	. . CONNECTOR, PLUG, ELECTRICAL ..	2
39	XBFZZ	XBFZZ	XBFZZ	XBFZZ	5970-01-594-2369	85901	ATUM 24/6 -0	. . SLEEVE, HEAT SHRINK, (CUT TO LENGTH AS NEEDED FROM ATUM 24/6-0 ON BULK ITEMS LIST)	2
40	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-00-464-0117	00779	36152	. . TERMINAL, RING	2
41	XBFZZ	XBFZZ	XBFZZ	XBFZZ		53421	04-20556-3	. . LAMINATE, LABEL	4
42	XBFZZ	XBFZZ	XBFZZ	XBFZZ		0PCR1	CD042256C	. . CABLE, SHEILDDED, (CUT TO LENGTH AS NEEDED FROM 09130SWC8 ON BULK ITEMS LIST)	1

(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
43	MFFZZ	MFFZZ	MFFZZ	MFFZZ	5975-01-592-9768	30554	88-20541-1	.. INSULATION SLEEVING, (CUT TO LENGTH AS NEEDED FROM 88-20541-1 ON BULK ITEMS LIST)	2
44	XBFZZ	XBFZZ	XBFZZ	XBFZZ		0PCR1	CD3101E18-19S	.. CONNECTOR, PLUG, ELECTRICAL ..	1
45	XAFFF	XAFFF	XAFFF	XAFFF		30554	04-20538	. SKID ASSEMBLY	1
46	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20499	.. EYE, LIFTING	4
47	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-589-3727	30554	04-20370	. NUT, PLAIN, CLINCH	12
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 01 DC ELECTRICAL REPAIR PARTS LIST

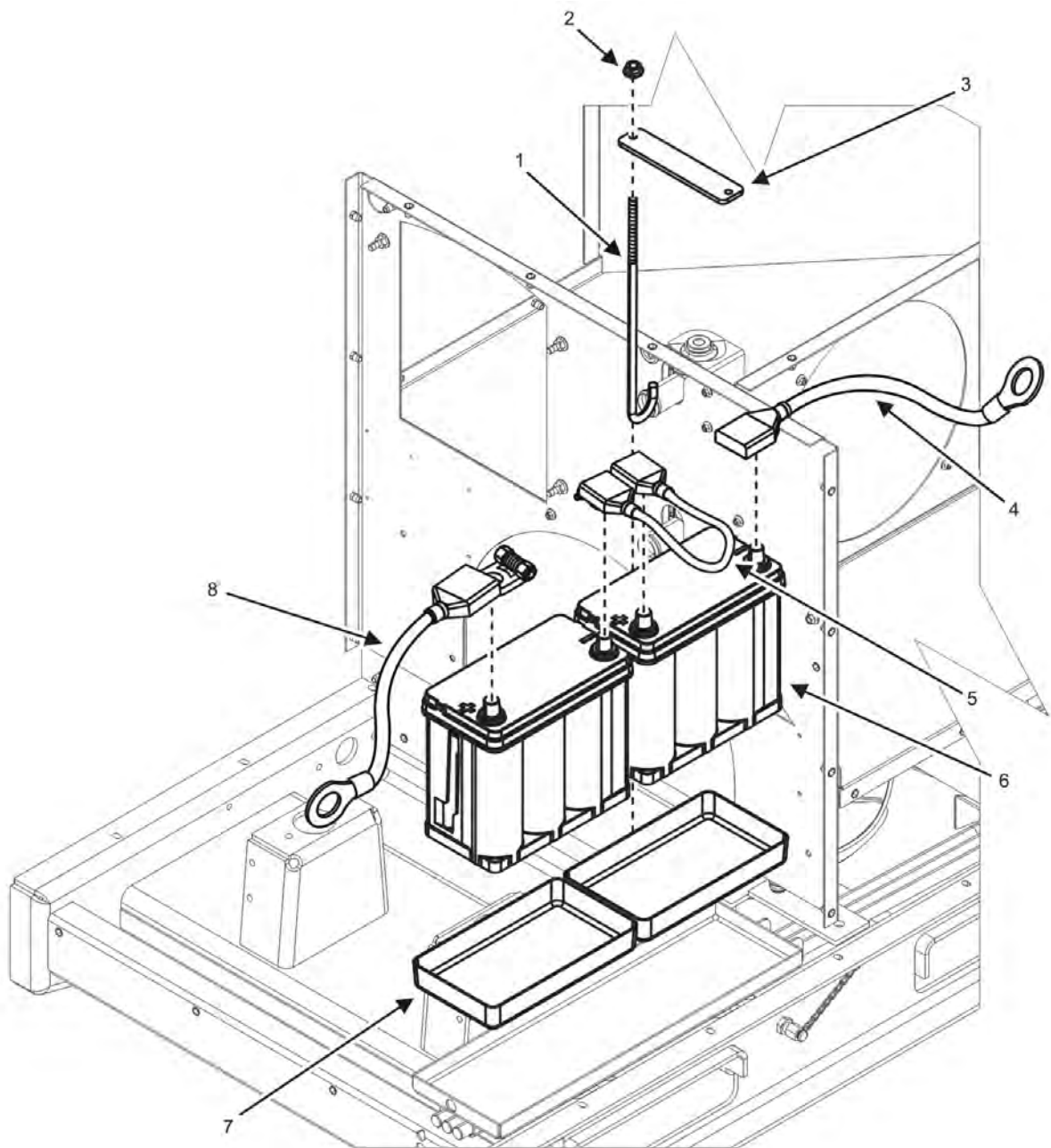


Figure 2. DC Electrical (Sheet 1 of 4).

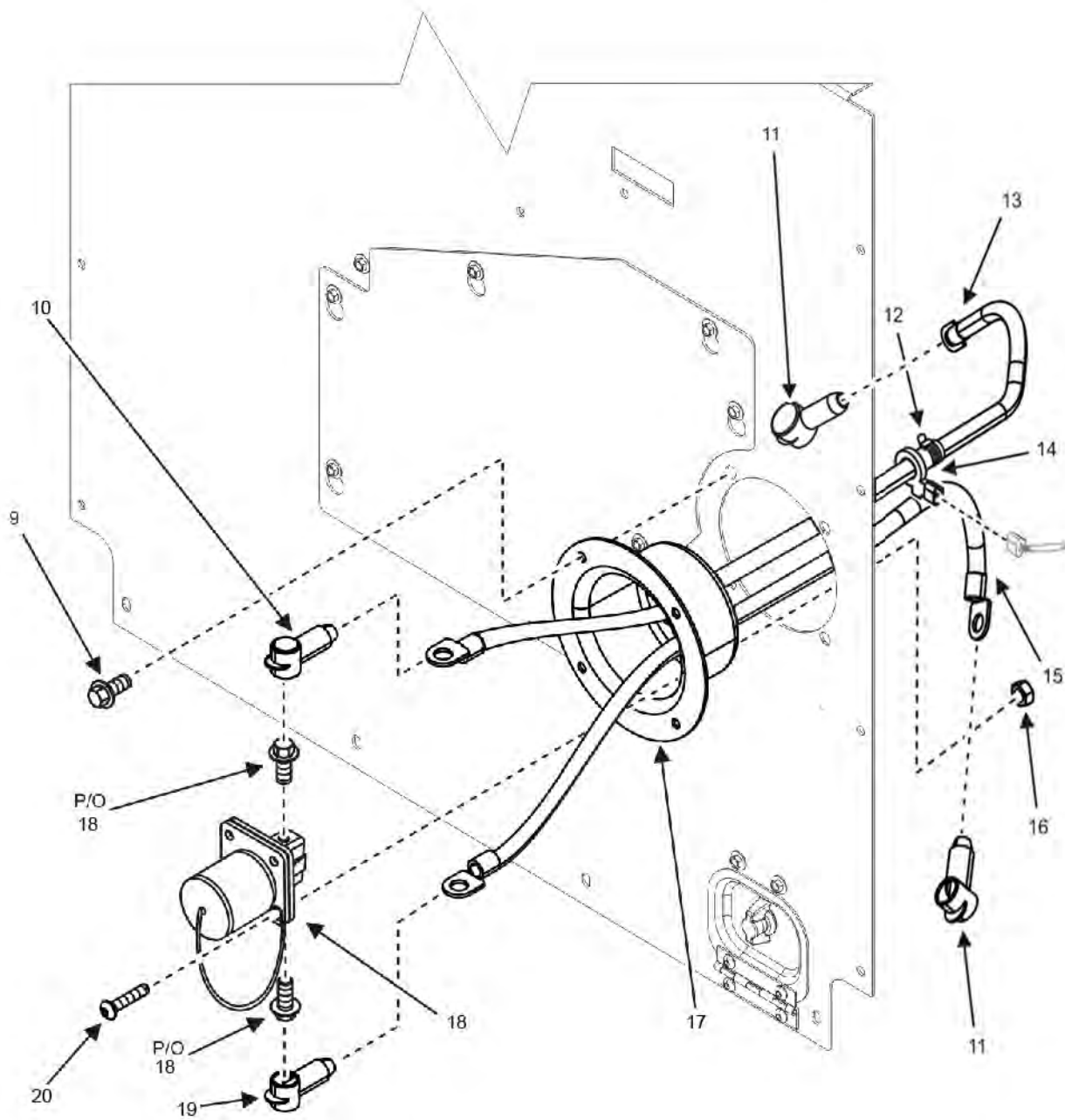


Figure 2. DC Electrical (Sheet 2 of 4).

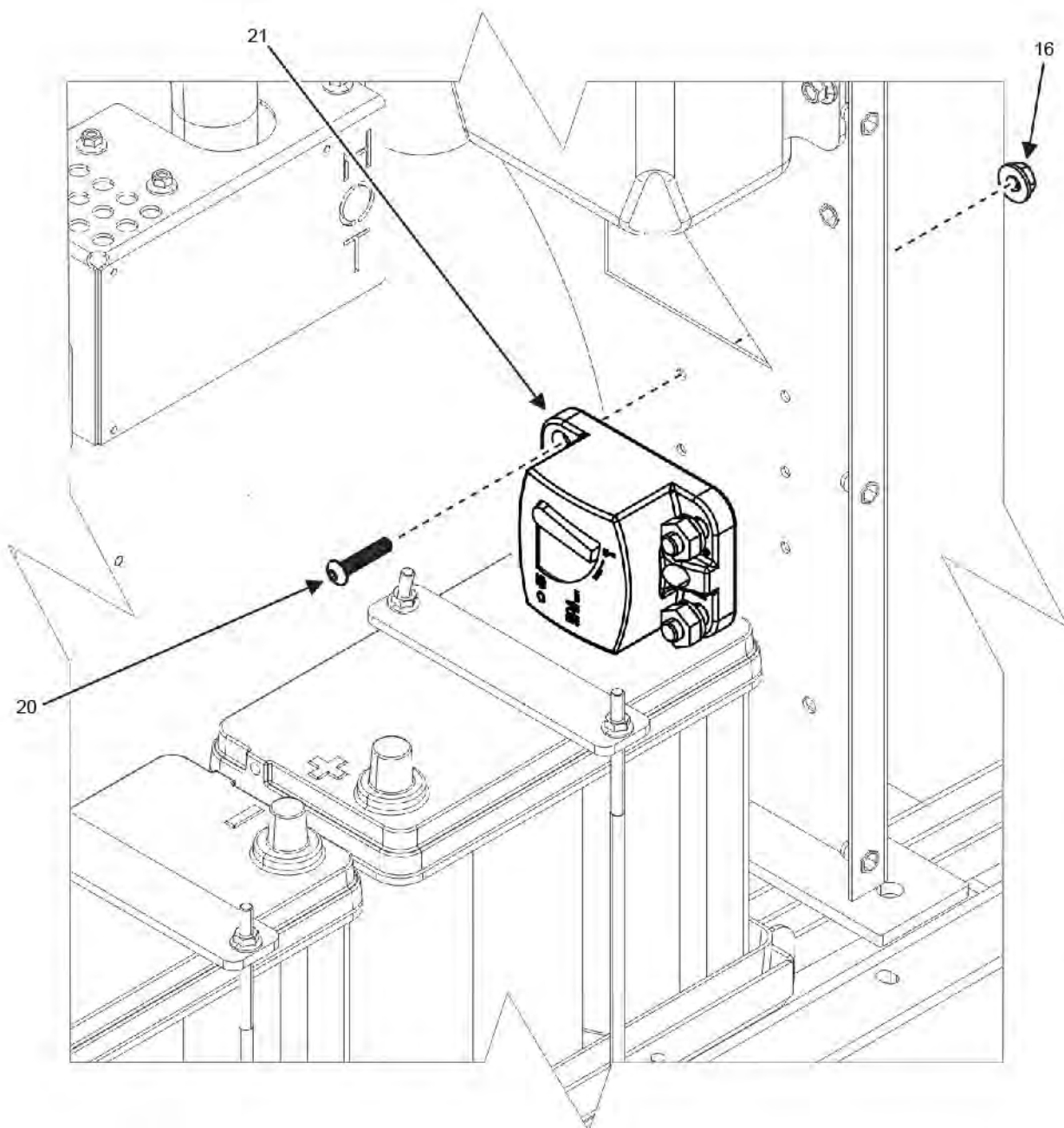


Figure 2. DC Electrical (Sheet 3 of 4).

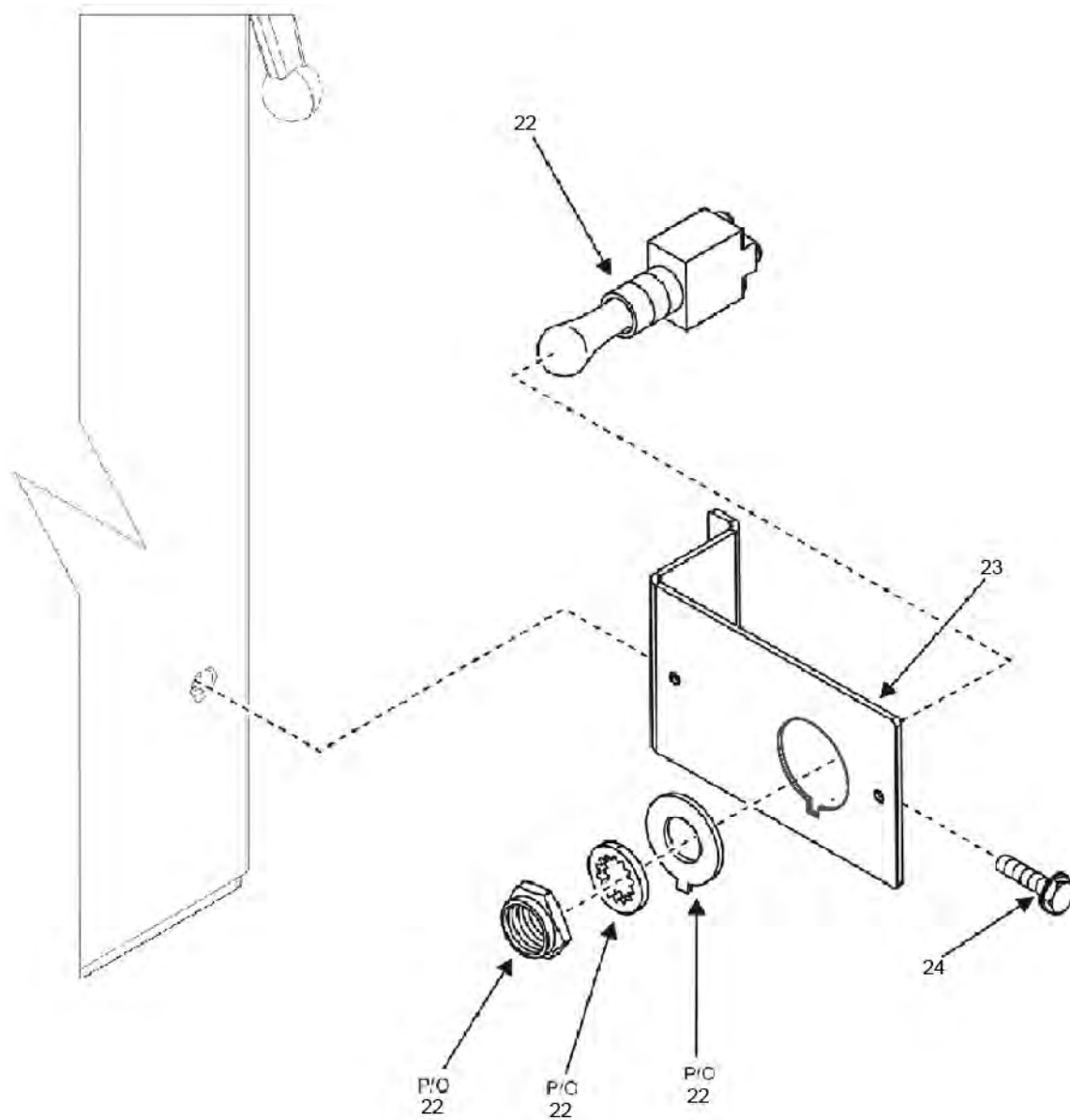


Figure 2. DC Electrical (Sheet 4 of 4).

(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 01 DC ELECTRICAL									
FIGURE 2 DC ELECTRICAL									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	6160-01-597-1381	30554	04-21107	. RETAINER, BATTERY	4
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-33-208-2057	D8286	DIN6923-M6	. NUT, PLAIN, EXTENDED	4
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	6160-01-600-2840	30554	04-20849	. RETAINER, BATTERY, PLATE	2
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	6150-01-592-6629	30554	04-20674-2	. LEAD, BATTERY, NEGATIVE	1
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ	6150-01-592-6626	30554	04-20673-1	. LEAD, ELECTRICAL, JUMPER	1
6	PAFZZ	PAFZZ	PAFZZ	PAFZZ	6140-01-529-7226	30554	88-22836	. BATTERY, STORAGE	2
7	PAFZZ	PAFZZ	PAFZZ	PAFZZ	6160-01-592-6648	30554	04-20585	. TRAY, BATTERY	2
8	PAFZZ	PAFZZ	PAFZZ	PAFZZ	6150-01-633-3633	30554	04-20674-1	. LEAD, BATTERY, POSITIVE	1
9	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-595-7637	4M343	44832	. SCREW	4
10	PCFZZ	PCFZZ	PCFZZ	PCFZZ	5340-01-619-7814	7Z043	222E3T02	. BOOT, DUST AND MOISTURE	2
11	PCFZZ	PCFZZ	PCFZZ	PCFZZ		7Z043	04-21417-2	. BOOT, DUST AND MOISTURE	1
12	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5975-01-588-6525	06383	PLT4S-M30	. STRAP, TIEDOWN, ELECTRICAL	1
13	PAFZZ	PAFZZ	PAFZZ	PAFZZ	6150-01-592-6743	30554	04-20675-1	. LEAD, ELECTRICAL, NATO SLAVE, POSITIVE	1
14	PAFZZ	PAFZZ	PAFZZ	PAFZZ	6625-01-592-6232	0S2B6	HAB-80-S	. SENSOR, CURRENT	1
15	PAFZZ	PAFZZ	PAFZZ	PAFZZ	6150-01-592-6746	30554	04-20675-2	. LEAD, ELECTRICAL, NATO SLAVE, NEGATIVE	1
16	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-168-8140	1FH08	DIN934M5	. NUT	7
17	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20645	. TERMINAL BOX	1
18	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-097-9974	19207	95-8165	. CONNECTOR, RECEPTACLE	1
19	PCFZZ	PCFZZ	PCFZZ	PCFZZ	5340-01-619-7821	30554	04-21417-3	. BOOT, DUST AND MOISTURE	1
20	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-596-3600	05047	AES46M508 016CH2A31	. SCREW, CAP, SOCKET HEAD	7
21	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5925-01-587-6954	1UW16	187050F-03 -1	. CIRCUIT BREAKER	1
22	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5930-00-683-1625	96906	MS24523-31	. SWITCH, TOGGLE, DEAD CRANK	1
23	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21343	. BRACKET, DEAD CRANK SWITCH	1

(1)	(2)				(3)	(4)	(5)	(6)	(7)
SMR CODE									
	a.	b.	c.	d.					
ITEM	AIR					PART	DESCRIPTION AND		
NO.	ARMY	FORCE	NAVY	USMC	NSN	CAGEC	NUMBER	USABLE ON CODE (UOC)	QTY
24	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-596-3670	05047	AES10M06A . SCREW, CAP, HEXAGON 016WB4K42		1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 0101 RELAY PANEL ASSEMBLY REPAIR PARTS LIST

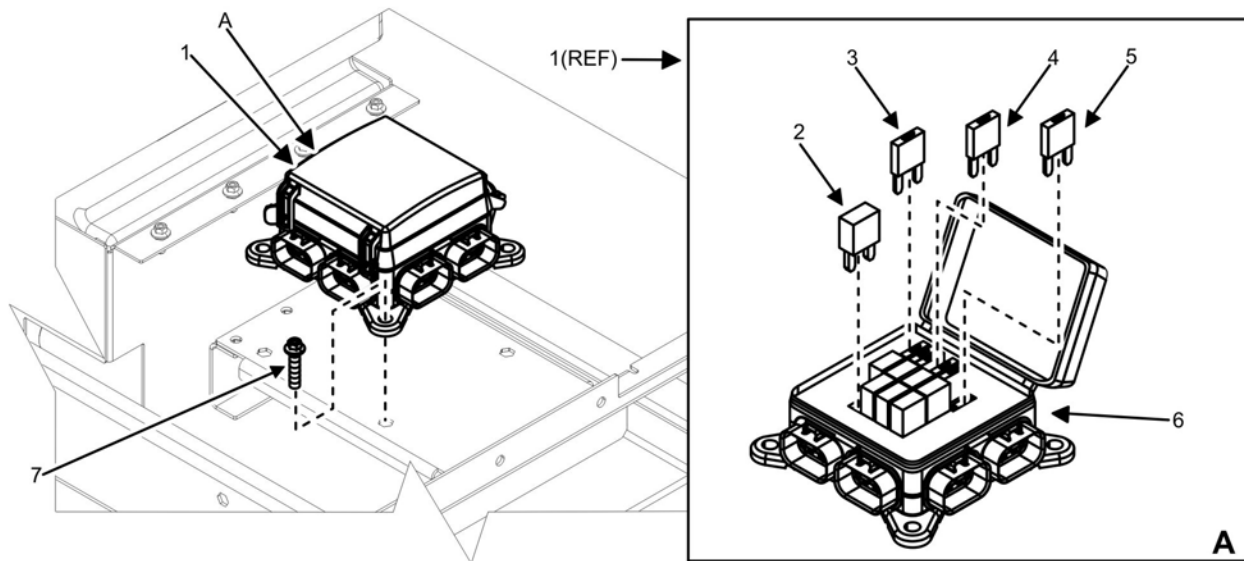


Figure 3. Relay Panel Assembly.

(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 0101 RELAY PANEL ASSEMBLY									
FIGURE 3 RELAY PANEL ASSEMBLY									
1	XBFFF	XBFFF	XBFFF	XBFFF		30554	04-20209	. PANEL, RELAY	1
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5945-01-597-1462	1UW16	B120-7032	. . RELAY	8
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5925-01-569-4427	30554	04-21406	. . CIRCUIT BREAKER	5
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5925-01-571-5799	1UW16	22330-200	. . CIRCUIT BREAKER	1
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5925-01-569-6394	1UW16	22310-200	. . CIRCUIT BREAKER	2
6	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21405	. . HOUSING, PANEL, RELAY	1
7	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-592-1168	05047	AES10M06A 020WB4K42	. SCREW, CAP, HEXAGON HEAD	4
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 02 HOUSING REPAIR PARTS LIST

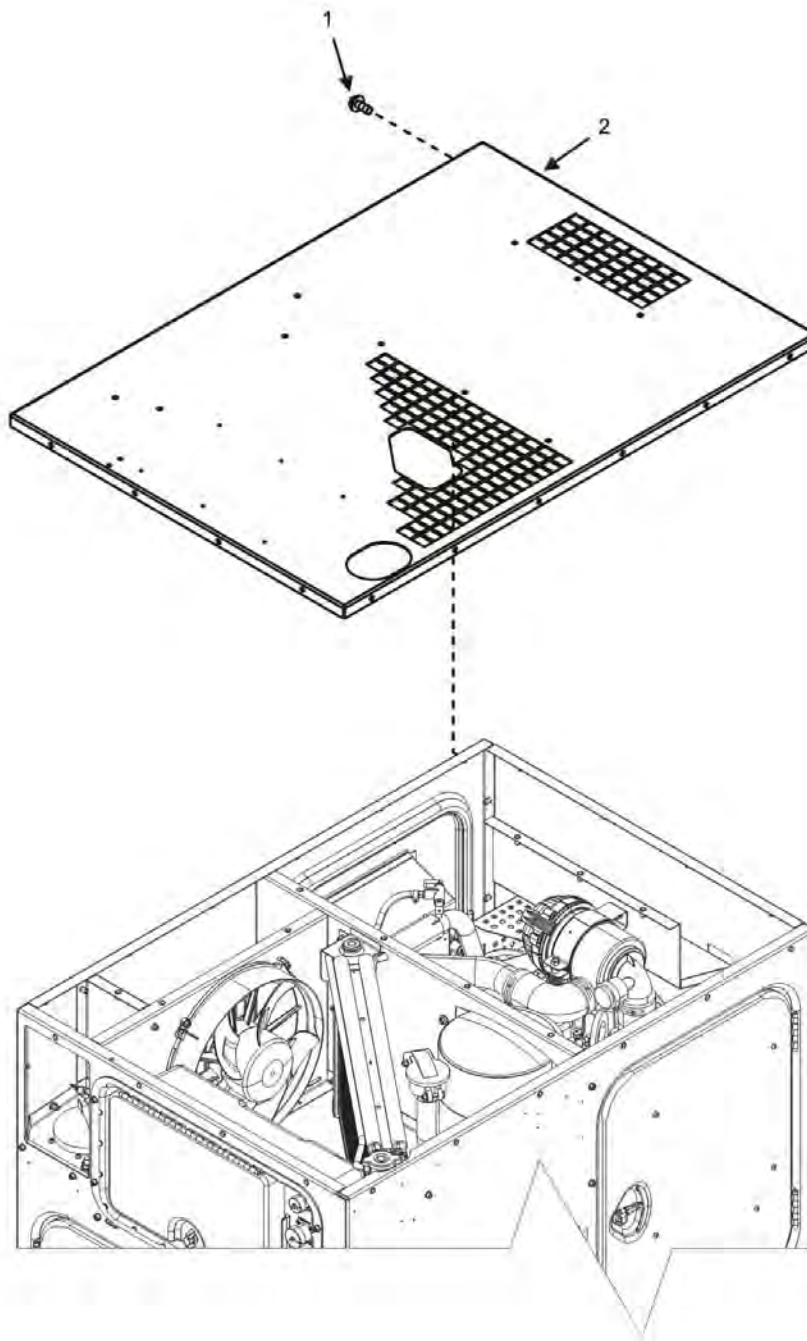


Figure 4. Housing (Sheet 1 of 15).

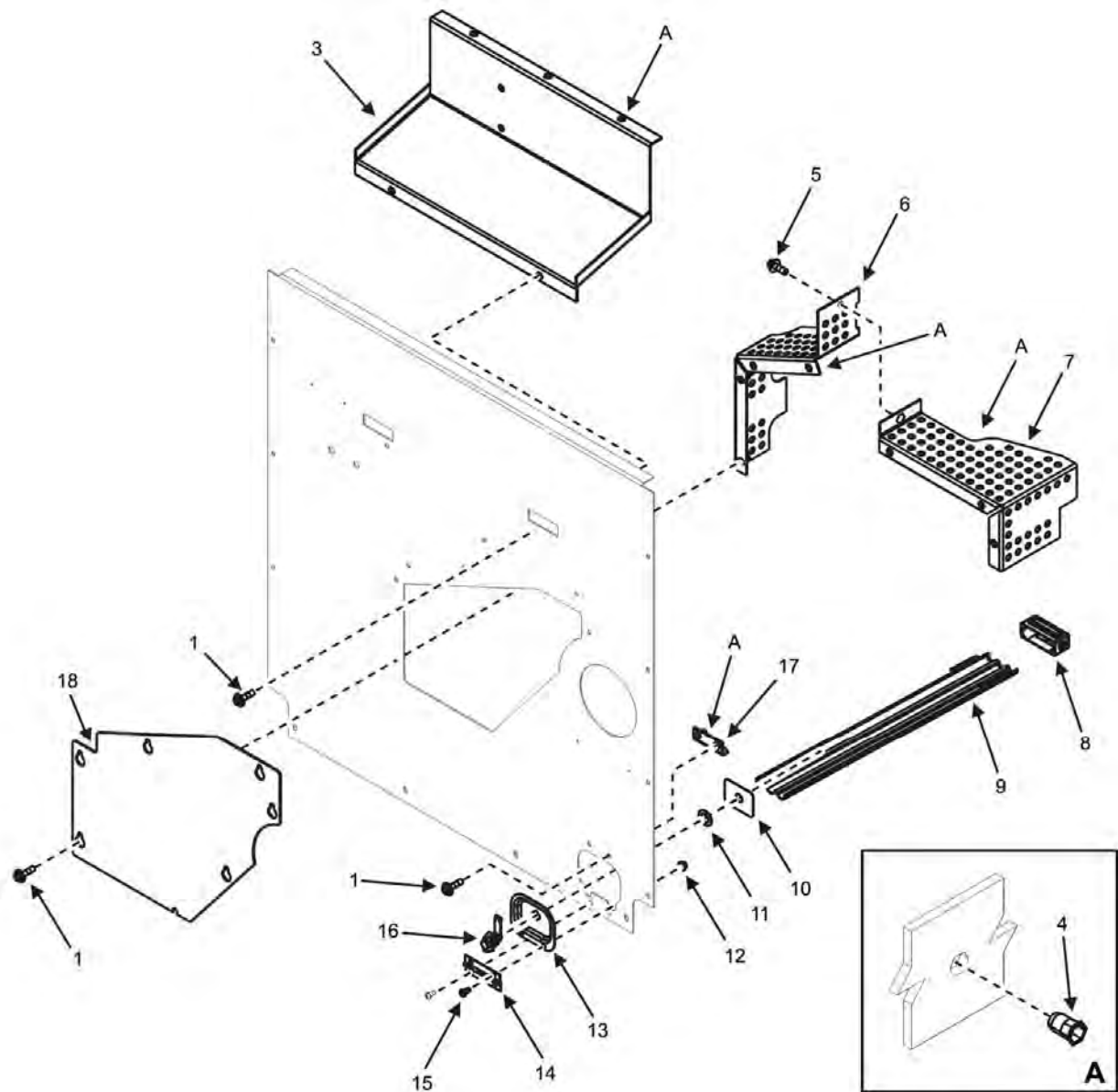


Figure 4. Housing (Sheet 2 of 15).

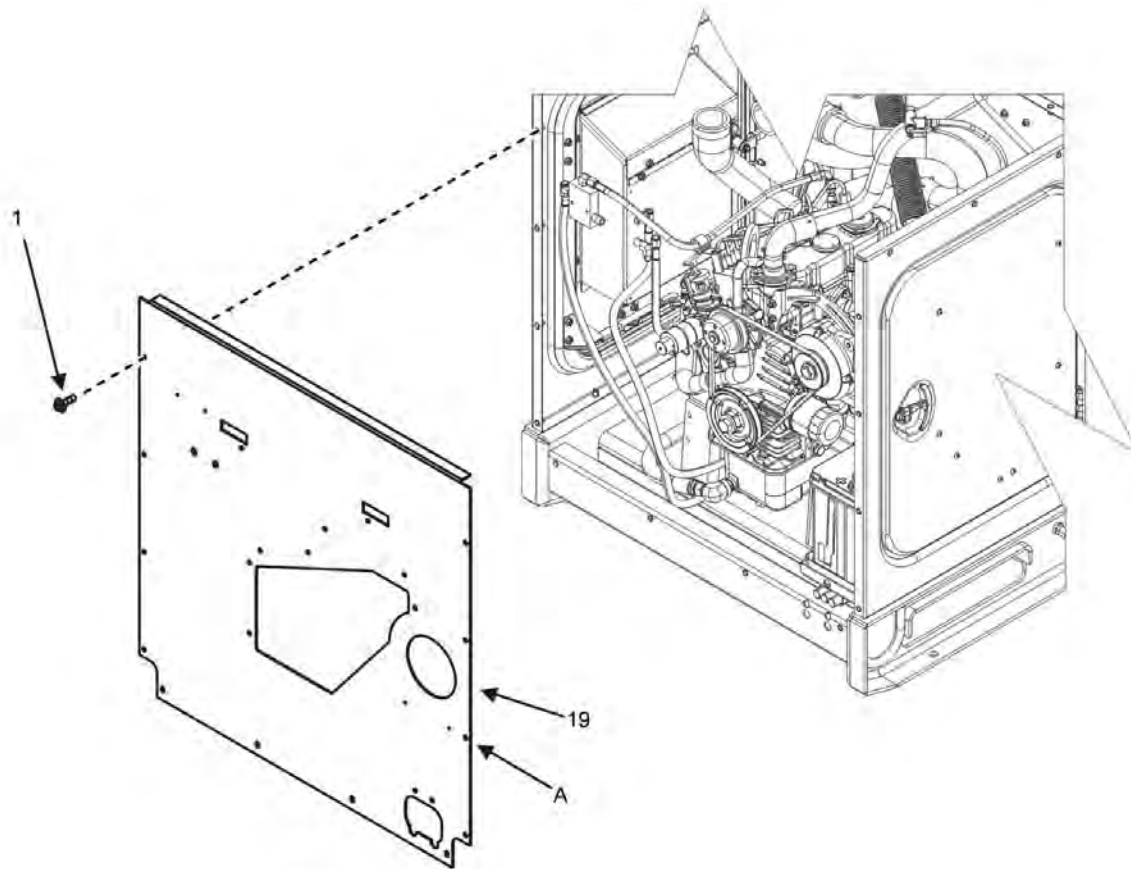


Figure 4. Housing (Sheet 3 of 15).

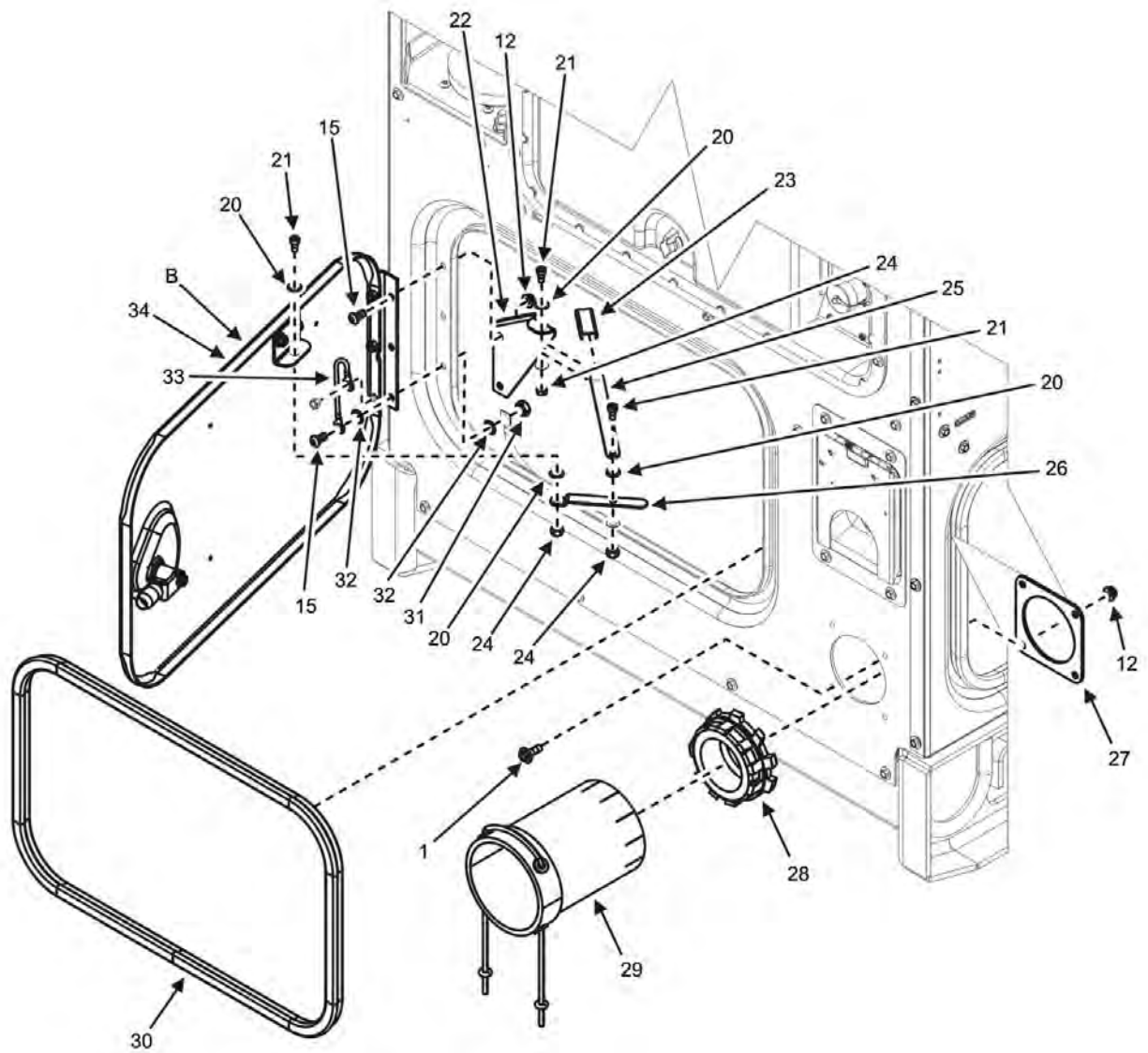


Figure 4. Housing (Sheet 4 of 15).

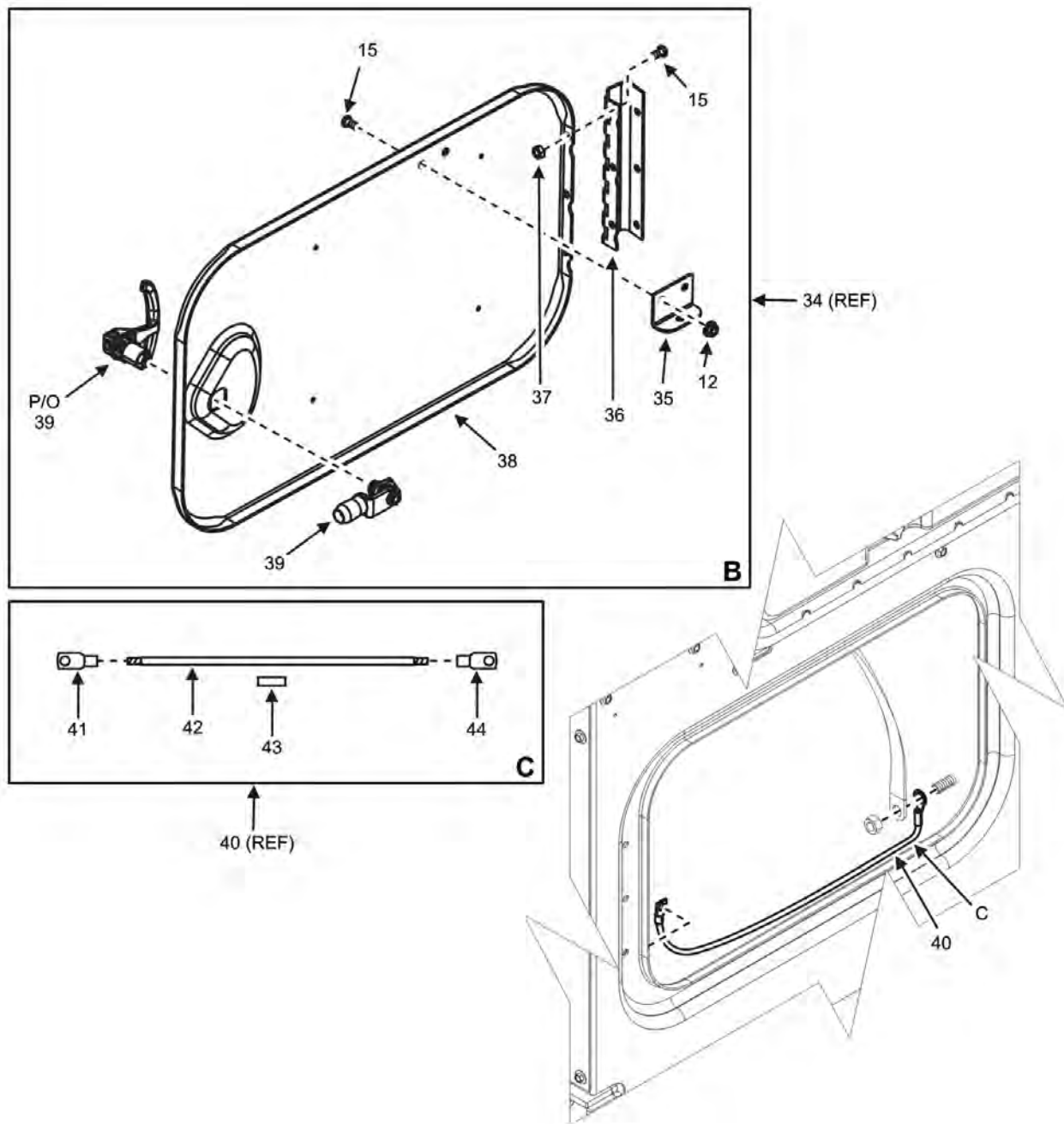


Figure 4. Housing (Sheet 5 of 15).

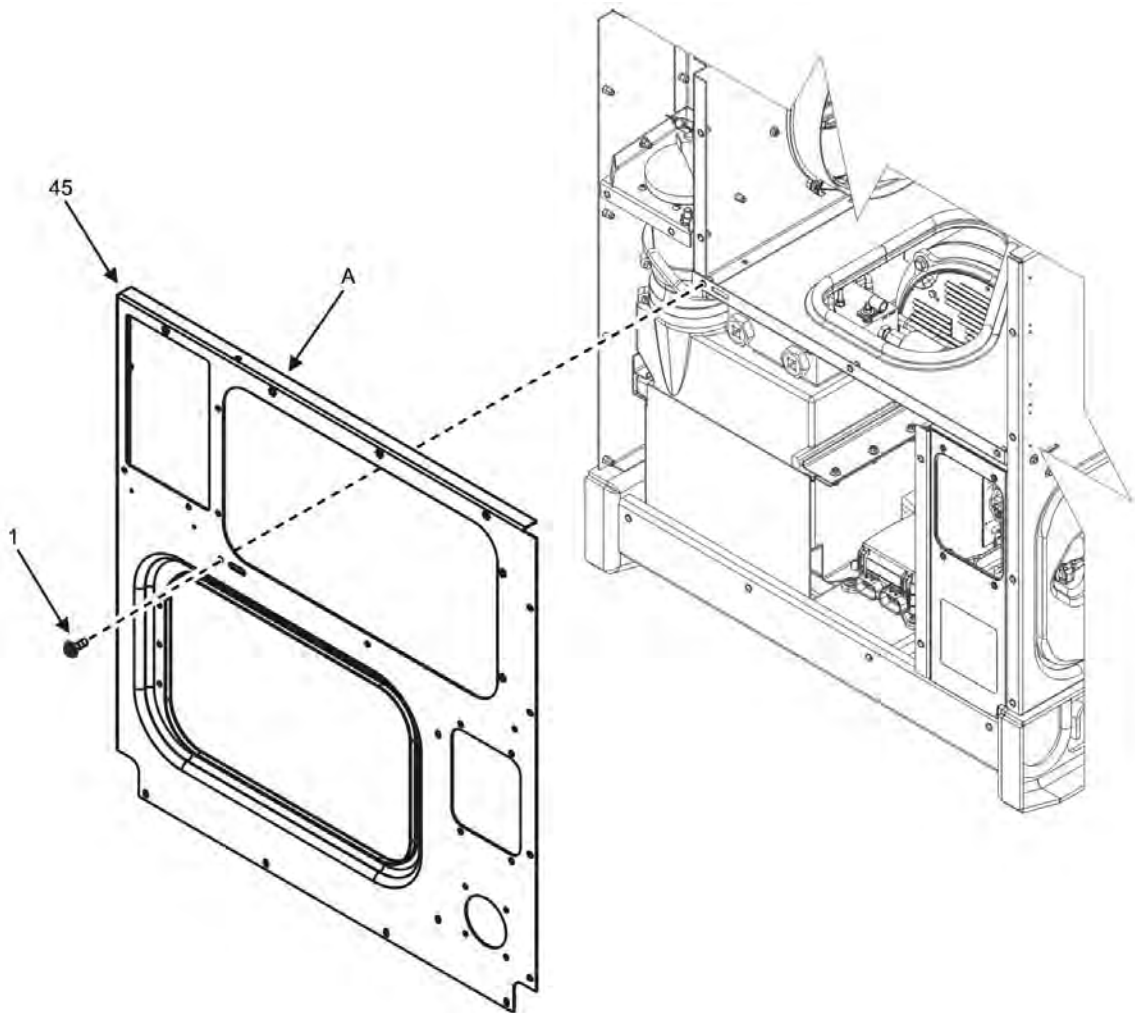


Figure 4. Housing (Sheet 6 of 15).

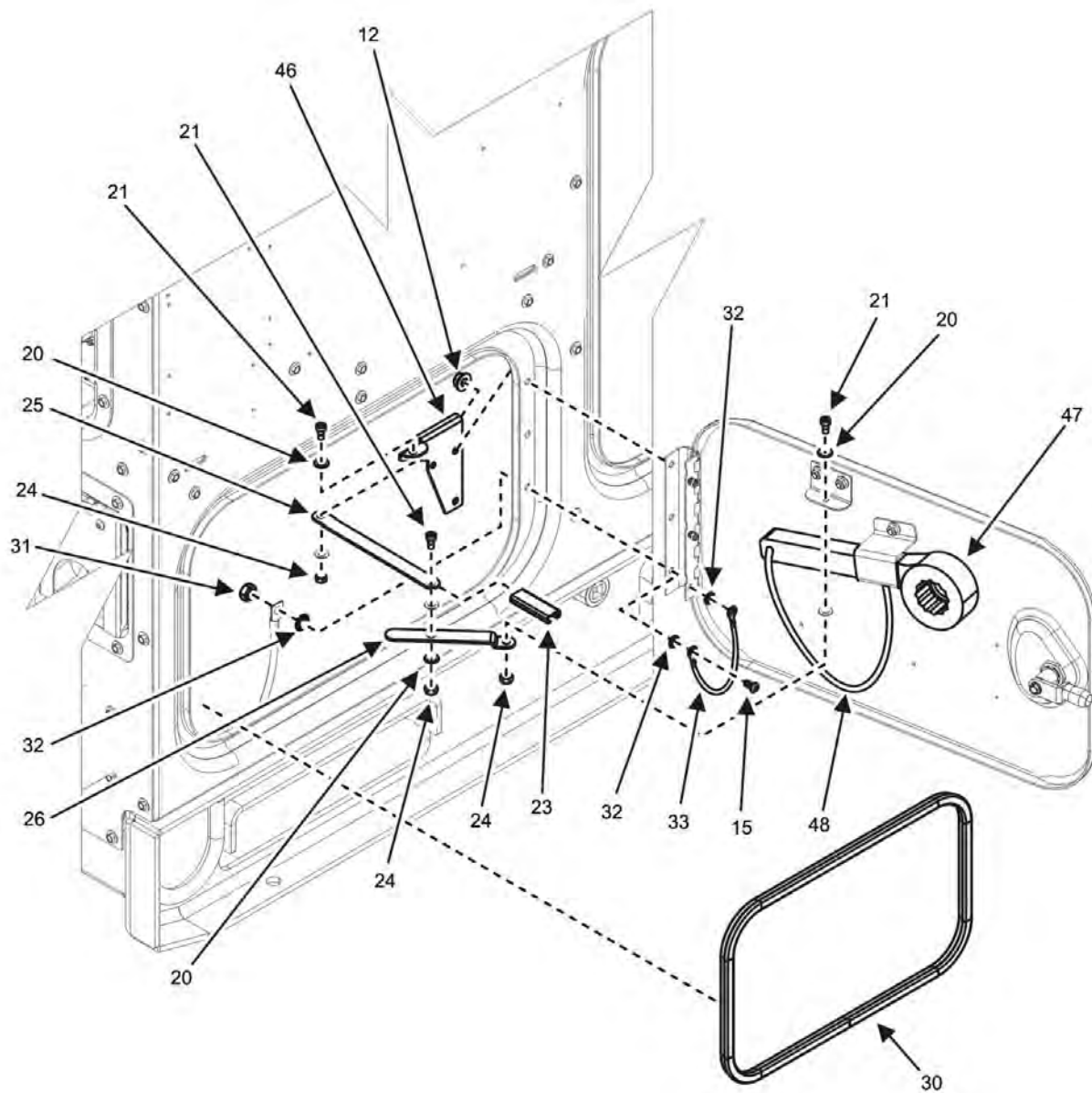


Figure 4. Housing (Sheet 7 of 15).

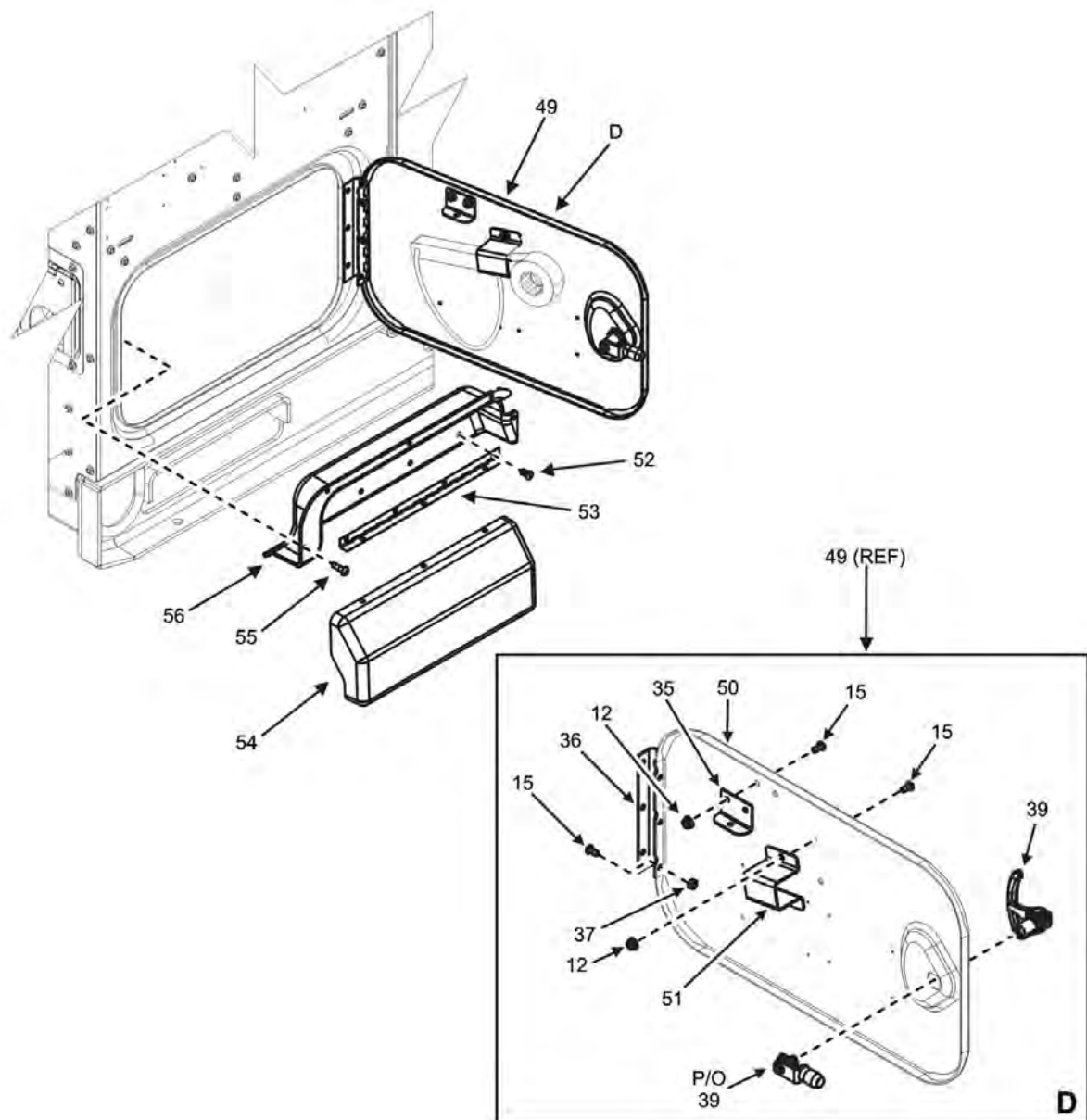


Figure 4. Housing (Sheet 8 of 15).

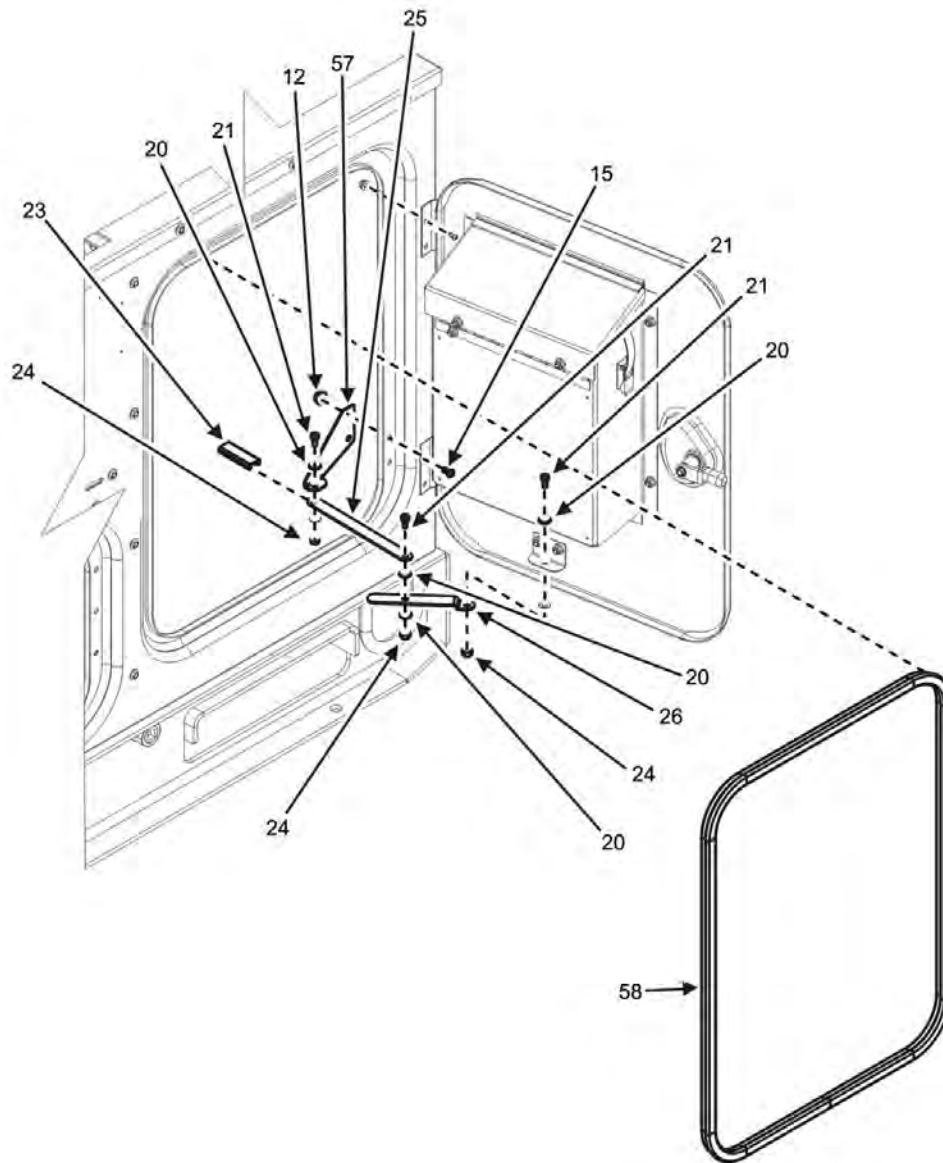


Figure 4. Housing (Sheet 9 of 15).

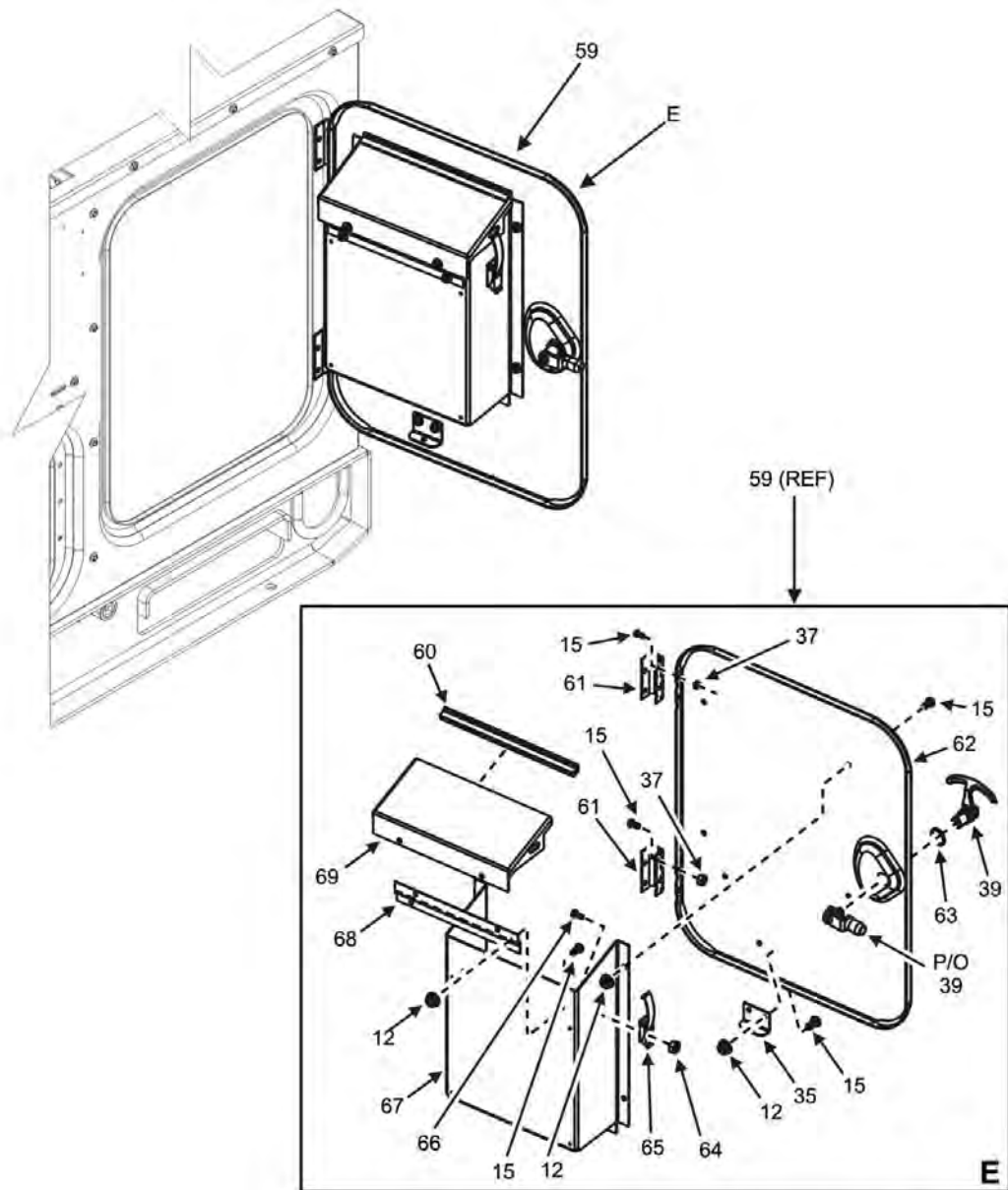


Figure 4. Housing (Sheet 10 of 15).

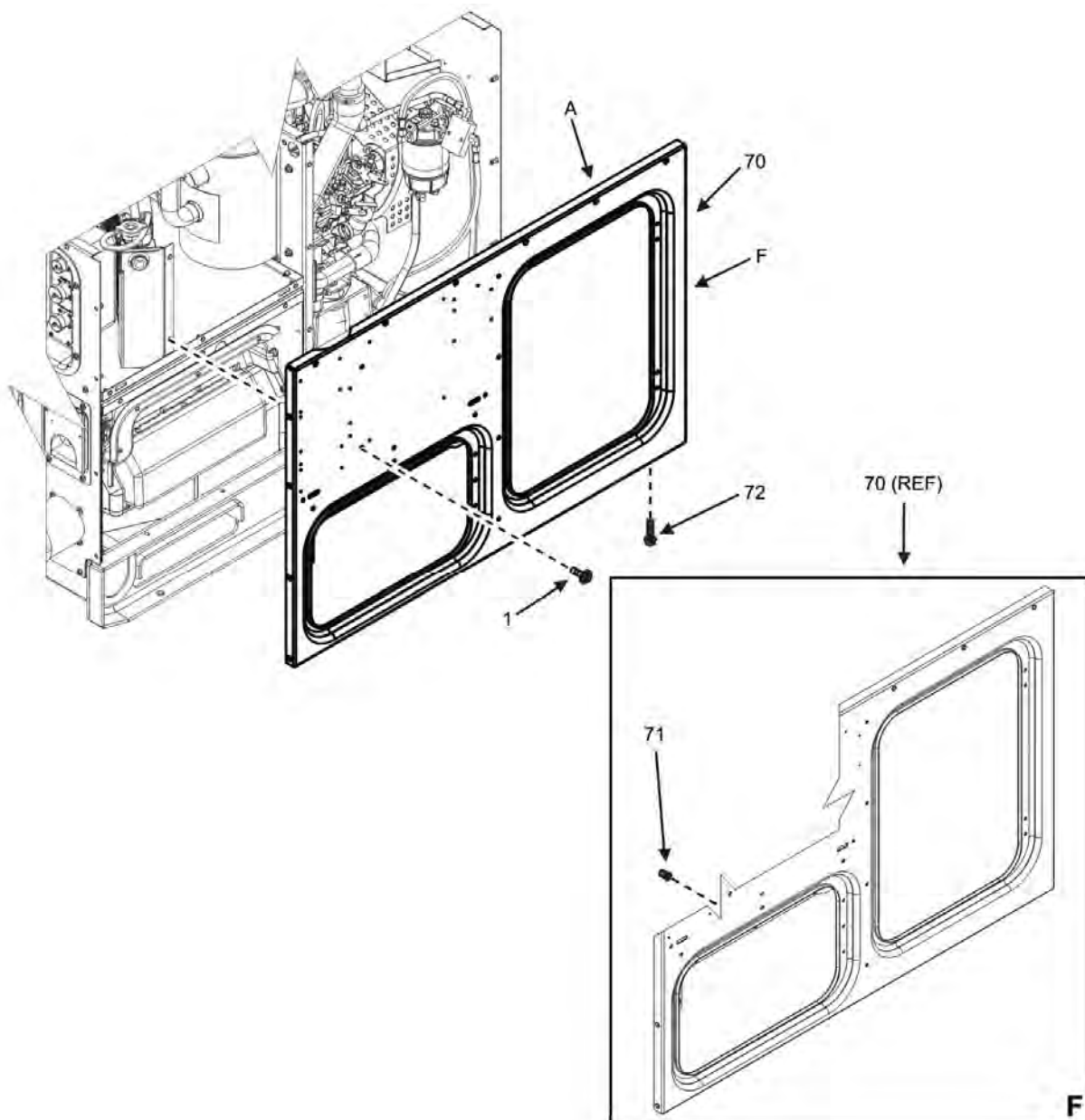


Figure 4. Housing (Sheet 11 of 15).

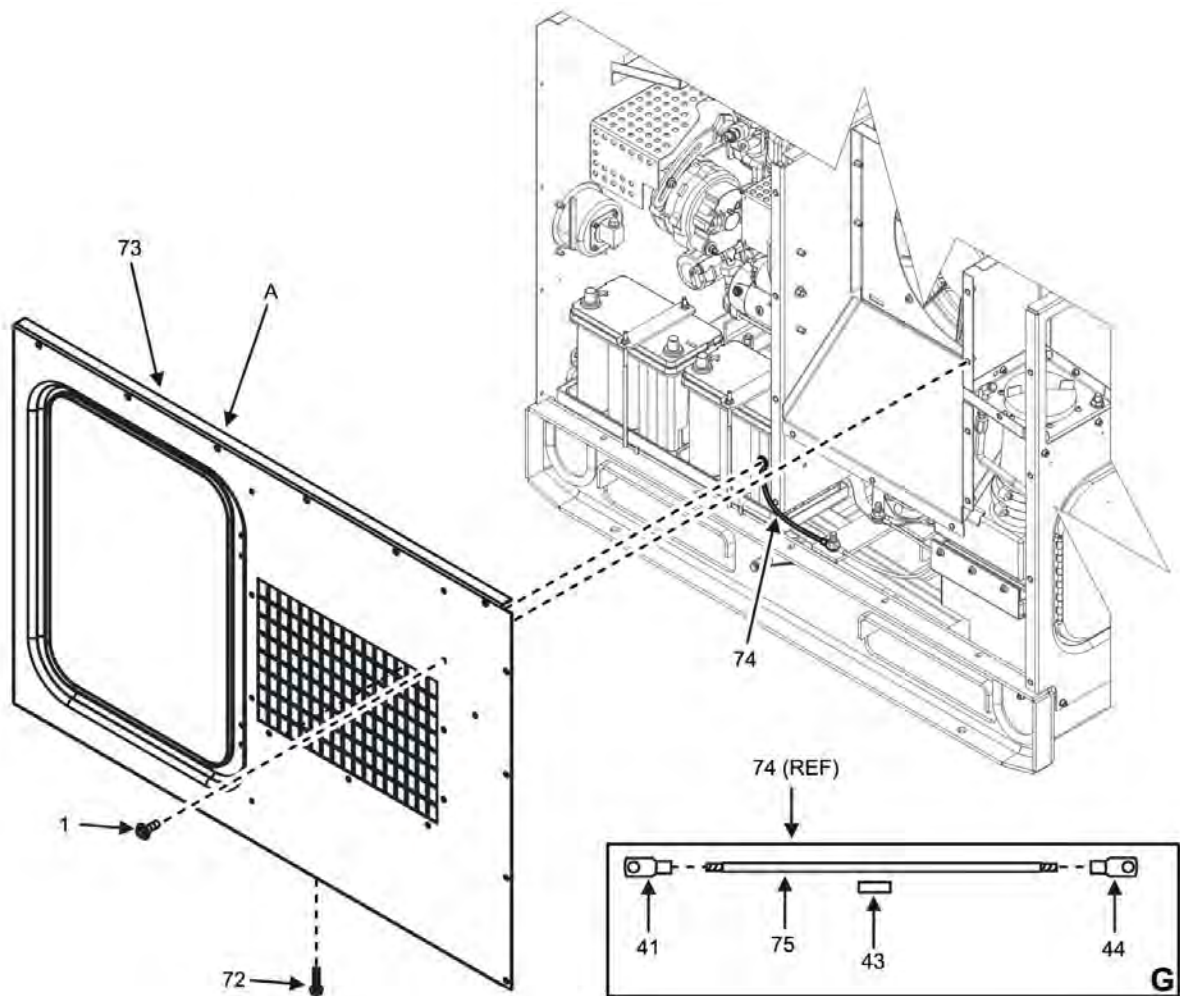


Figure 4. Housing (Sheet 12 of 15).

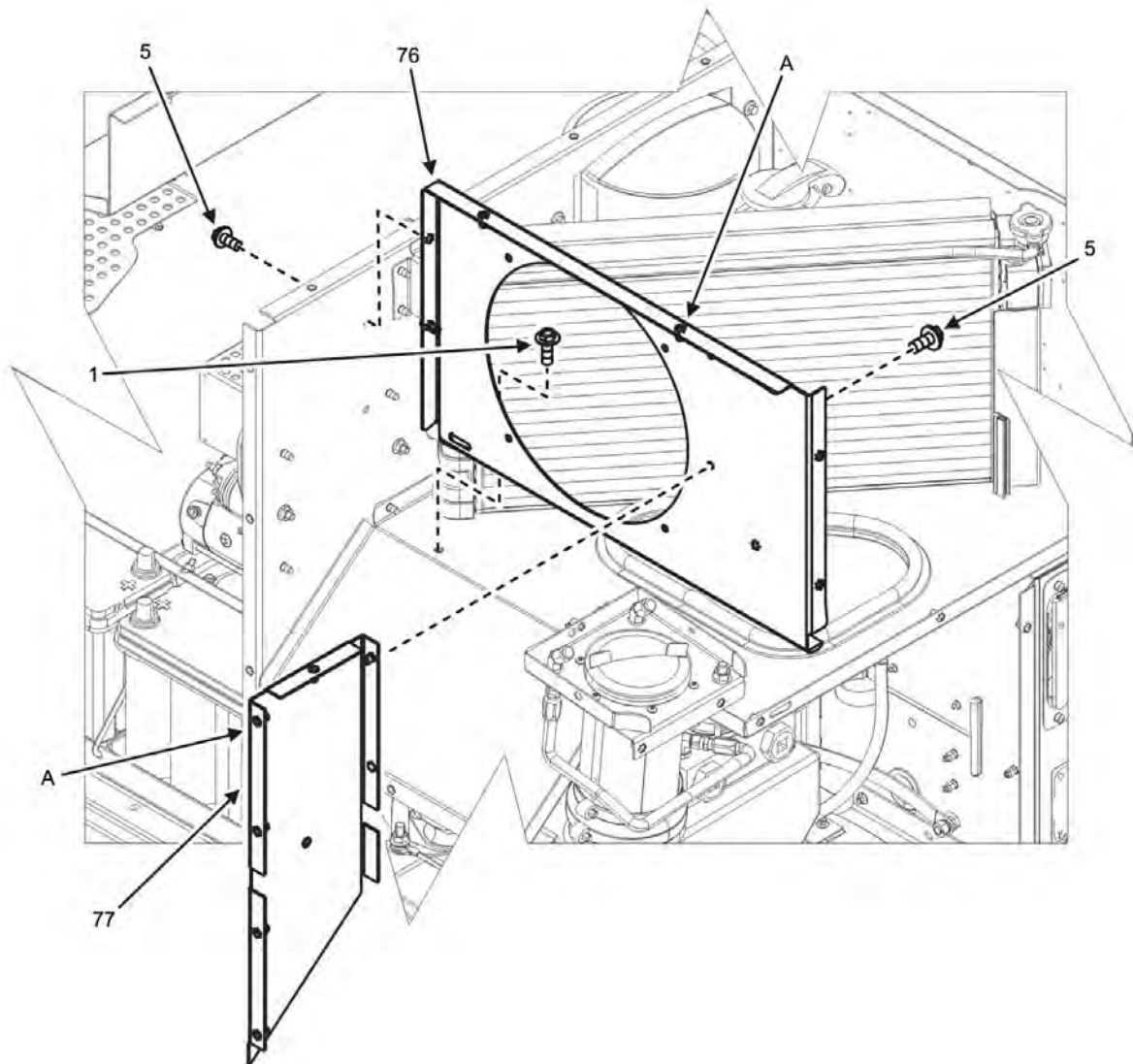


Figure 4. Housing (Sheet 13 of 15).

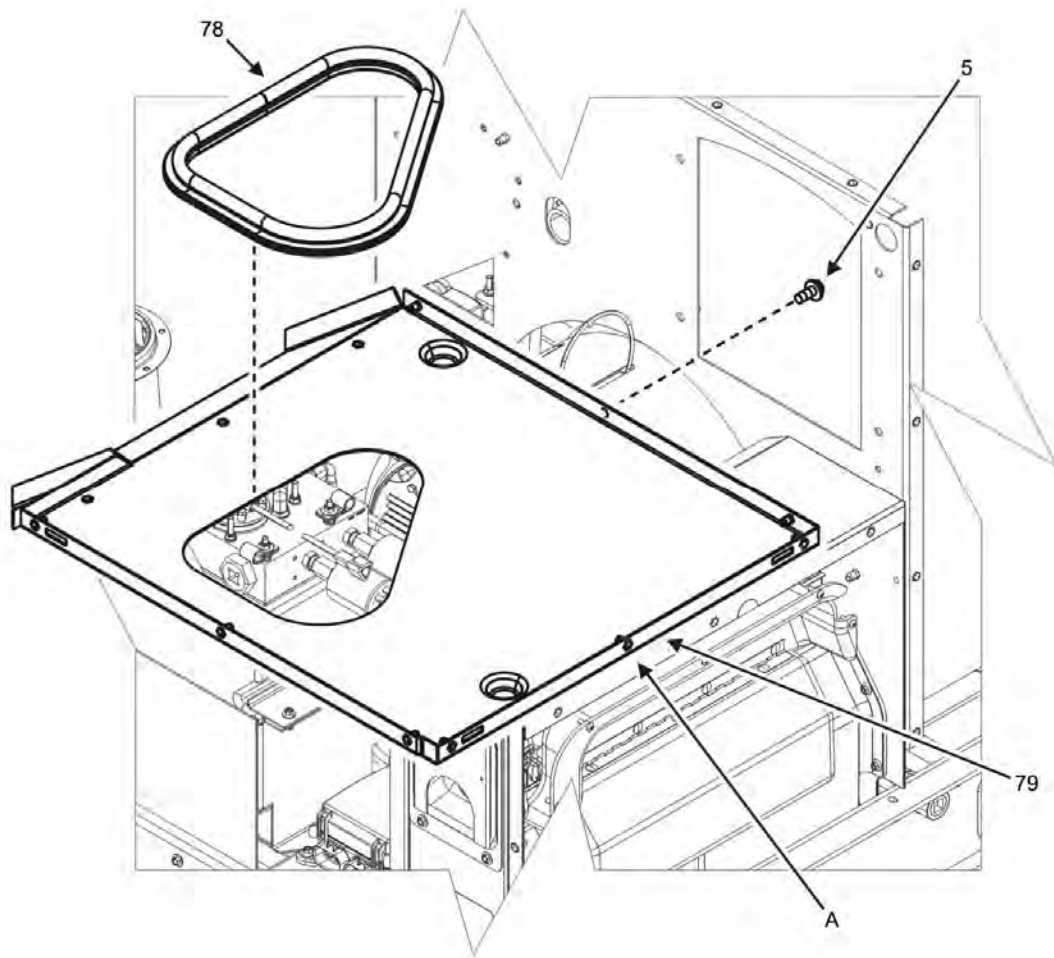


Figure 4. Housing (Sheet 14 of 15).

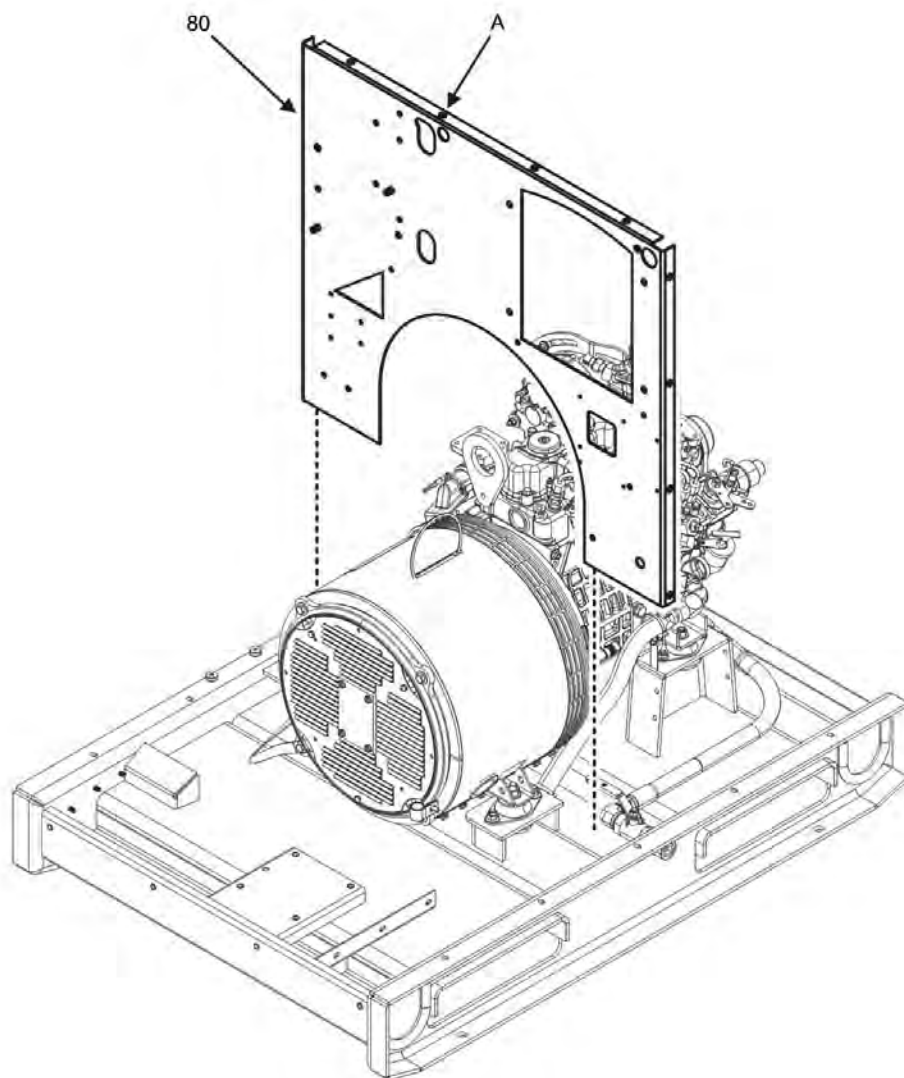


Figure 4. Housing (Sheet 15 of 15).

(1)	(2)				(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE				NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
GROUP 02 HOUSING									
FIGURE 4 HOUSING									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-595-7637	4M343	44832	. SCREW, FLANGE HEAD	112
2	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20992	. PANEL, TOP	1
3	XBFFF	XBFFF	XBFFF	XBFFF		30554	04-20940	. DUCT, AIR	1
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-589-3727	30554	04-20370	. . INSERT,SCREW THREAD	116
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-596-3670	05047	AES10M06A 016WB4K42	. SCREW, CAP, HEXAGON, M6	7
6	PAFFF	PAFFF	PAFFF	PAFFF	5340-01-593-2741	30554	04-20986	. GUARD, BELT, RH	1
7	PAFFF	PAFFF	PAFFF	PAFFF	5340-01-593-2738	30554	04-20985	. GUARD, BELT, LH	1
8	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2805-01-641-5714	44940	04-21725	. DAMPER, VIBRATION	1
9	PAFZZ	PAFZZ	PAFZZ	PAFZZ	6160-01-641-8971	30554	04-21723	. TRAY, CORRUGATED	1
10	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-640-8447	30554	04-21724	. BUMPER	1
11	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-641-0640	30554	04-21733	. WASHER, FLAT	1
12	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-33-208-2057	D8286	DIN6923-M6	. NUT, PLAIN, EXTENDED	46
13	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5342-01-593-2754	30554	04-20747	. DOOR, ACCESS	1
14	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-593-6025	30554	04-20748	. HINGE	1
15	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-99-219-7181	I9008	ISO7380-M6 X12-A2-70	. SCREW, CAP, SOCKET HEAD	62
16	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-589-9988	S8812	8-325-88	. LATCH	1
17	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-593-2765	30554	04-20944	. STRIKE, LATCH	1
18	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5895-01-591-3501	30554	04-21365	. PANEL, ACCESS	1
19	XBFFF	XBFFF	XBFFF	XBFFF		30554	04-20987	. PANEL, ENCLOSURE, FRONT	1
20	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-596-3763	05047	AEW23X06 R10MSE4A 31	. WASHER, FLAT	28
21	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-588-9321	3A054	90278A331	. SCREW, SHOULDER	12
22	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-593-2743	30554	04-21073	. BRACKET, DOOR	1
23	PAFZZ	PAFZZ	PAFZZ	PAFZZ	3040-01-597-1148	30554	04-21076	. LINK, DOOR	4
24	PAFZZ	PAFZZ	PAFZZ	PAFZZ		30554	AEN04M508 000CX0A36	. NUT,SELF-LOCKING,HEX	12
25	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4910-01-589-3803	30554	04-21074	. BRACE, DOOR STAY, TOP	4

(1) ITEM NO.	(2) SMR CODE				(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
26	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4910-01-589-3807	30554	04-21075	. BRACE, DOOR STAY, BOTTOM	4
27	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20282	. PLATE, RETAINER, MOUNTING	1
28	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5365-01-590-0371	30554	69-570-2	. BUSHING, SOCK	1
29	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2920-01-388-2776	30554	88-20218	. SLEEVE, TUBE	1
30	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-20872-1	. SEAL, EDGE, (MAKE FROM 04-20868 ON BULK ITEM LIST, CUT TO LENGTH 1,370±5 MM)	4
31	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-33-208-2057	D8286	DIN6923-M6	. NUT, HEX, FLANGE M6X1	2
32	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-596-3734	05047	AEW13X250 000GD5A21	. WASHER, LOCK	6
33	PAFZZ	PAFZZ	PAFZZ	PAFZZ	6145-01-588-3447	30554	04-21318-2	. STRAP, GROUNDING	2
34	XBFFF	XBFFF	XBFFF	XBFFF		30554	04-21162	. DOOR, ASSEMBLY	1
35	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-597-3082	30554	04-21072	. . BRACKET, DOOR STAY	4
36	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-593-5979	30554	04-20630	. . HINGE	2
37	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-080-0030	61080	2915011007	. . NUT, PLAIN, HEXAGON	14
38	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5342-01-593-2753	30554	04-21159	. . DOOR, ACCESS	1
39	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-590-0063	S8812	8-325-82	. . LATCH	4
40	XBFFF	XBFFF	XBFFF	XBFFF	6150-01-593-2803	30554	04-21153-4	. LEAD,ELECTRICAL	2
41	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-00-113-9828	96906	MS25036-1 48	. . TERMINAL, LUG, 12-10 AWG M6 RING	3
42	MFFZZ	MFFZZ	MFFZZ	MFFZZ		0X4C9	04-21158	. . STRAND, WIRE, (MAKE FROM 3271-12-65 ON BULK ITEM LIST, CUT TO LENGTH 875±25 MM)	2
43	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20556-9	. . LAMINATE, LABEL COVER	3
44	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-01-585-9913	30554	04-21154	. . TERMINAL, LUG, 12-10 AWG M10 RING	3
45	XBFFF	XBFFF	XBFFF	XBFFF		30554	04-20334	. PANEL, REAR	1
46	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-593-2744	30554	04-21102	. BRACKET, OUTPUT BOX DOOR STAY	1
47	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5120-01-373-8976	30554	88-21146	. WRENCH, BOX	1
48	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4020-01-476-9072	30554	04-21322	. FIBER ROPE ASSEMBLY	1
49	XBFFF	XBFFF	XBFFF	XBFFF		30554	04-20400	. DOOR, OUTPUT BOX ASSEMBLY	1
50	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20332	. . DOOR, OUTPUT BOX	1
51	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20285	. . BRACKET, WRENCH MOUNTING	1

(1) ITEM NO.	(2) SMR CODE				(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
52	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5325-01-589-7994	6B3V9	RBF-7.1-11 .1-12	. CLIP	7
53	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-597-1365	30554	04-20364	. HINGE, GUARD	1
54	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20369	. GUARD, PLASTIC, OUTPUT BOX	1
55	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-596-3600	05047	AES46M508 016CH2A31	. SCREW, BUTTON HEAD SOCKET	5
56	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-593-2750	30554	04-21104	. GUARD, PLASTIC, MOUNT	1
57	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-597-1380	30554	04-21081	. BRACKET, LEFT AND RIGHT DOOR STAY	2
58	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-21748-1	. SEAL, EDGE, (MAKE FROM 04-20868 ON BULK ITEM LIST, CUT TO LENGTH 1,839±5 MM)	2
59	XBFFF	XBFFF	XBFFF	XBFFF		30554	04-20649	. DOOR, ASSEMBLY, RIGHT AND LEFT	2
60	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-21031-4	. . SEAL, EDGE, (MAKE FROM A1512 ON BULK ITEM LIST, CUT TO LENGTH 259±3 MM)	2
61	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-593-5913	30554	04-20651	. . HINGE	4
62	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20333	. . DOOR, ENCLOSURE	2
63	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-617-7577	30554	04-21766	. WASHER, FLAT	2
64	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-500-6541	3L891	40CNFHS	. . NUT, PLAIN, HEXAGON	2
65	XBFZZ	XBFZZ	XBFZZ	XBFZZ	5340-01-396-0454	94222	97-50-170- 11	. . CATCH, CLAMPING	2
66	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-12-163-0920	D8286	DIN7985A1- M4X8	. . SCREW, MACHINE	2
67	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21039	. . BOX, TOOL	2
68	XBFZZ	XBFZZ	XBFZZ	XBFZZ	5340-01-597-3073	30554	04-21045	. . HINGE, TOOL BOX	2
69	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21046	. . COVER, BOX, TOOL	2
70	XBFFF	XBFFF	XBFFF	XBFFF		30554	04-20405	. PANEL, RIGHT	1
71	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-589-3734	3A2G6	39101-7503 0	. . NUT, PLAIN, CLINCH	4
72	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-592-1168	05047	AES10M06A 020WB4K42	. SCREW, HEX FLANGE HEAD M6X1X20	10
73	XBFFF	XBFFF	XBFFF	XBFFF		30554	04-20404	. PANEL, LEFT	1
74	XBFFF	XBFFF	XBFFF	XBFFF		30554	04-21153-6	. LEAD,ELECTRICAL	1
75	MFFZZ	MFFZZ	MFFZZ	MFFZZ		0X4C9	04-21158	. . STRAND, WIRE, (MAKE FROM 3271-12-65 ON BULK ITEM LIST, CUT TO LENGTH 216±25 MM)	1

(1)	(2)				(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE				NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
76	XBFFF	XBFFF	XBFFF	XBFFF		30554	04-20883	. DUCT, AIR, FAN	1
77	XBFFF	XBFFF	XBFFF	XBFFF		30554	04-20941	. PANEL, SUPPORT	1
78	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-21282-1	. SEAL, WEATHER, (MAKE FROM A2539 ON BULK ITEM LIST, CUT TO LENGTH 920±5 MM)	1
79	XBFFF	XBFFF	XBFFF	XBFFF		30554	04-20909	. PANEL, RADIATOR	1
80	XBFFF	XBFFF	XBFFF	XBFFF		30554	04-20908	. CROSSMEMBER, ENCLOSURE	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 03 DCS REPAIR PARTS LIST

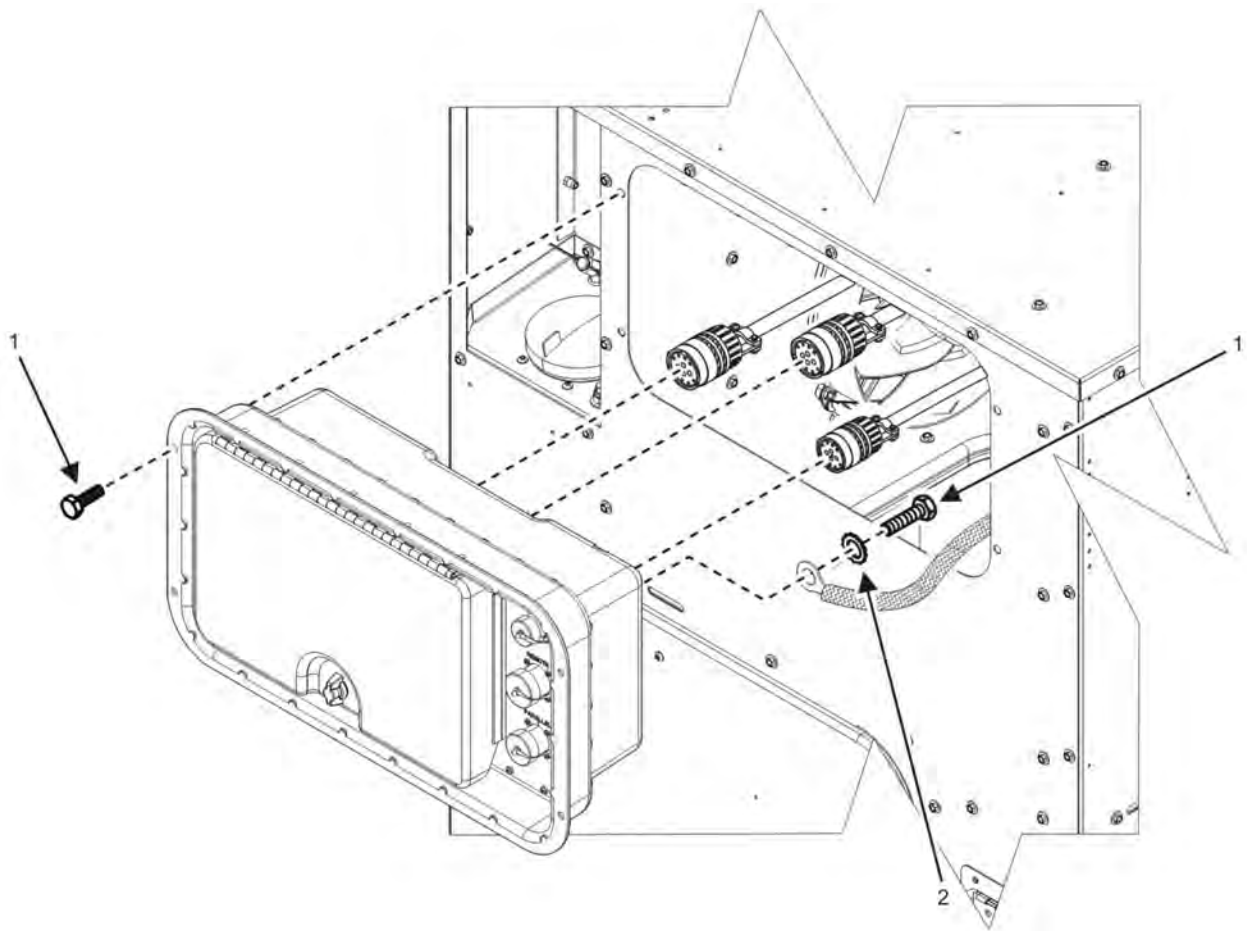


Figure 5. DCS (Sheet 1 of 2).

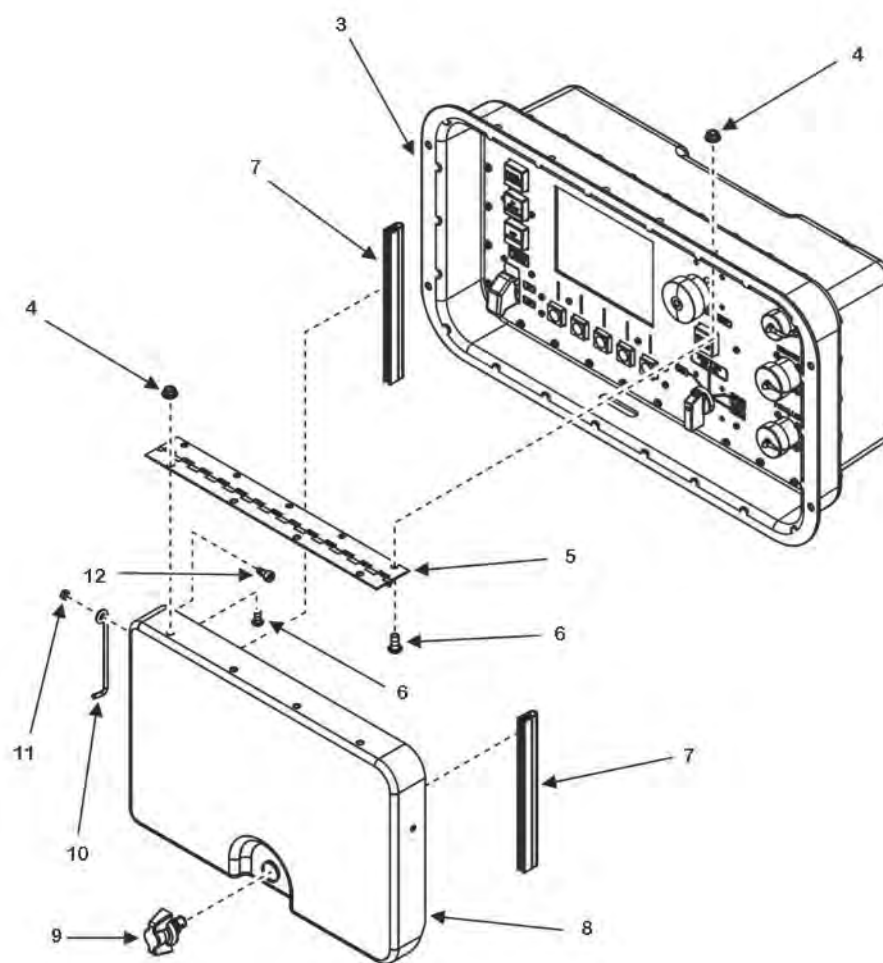


Figure 5. DCS (Sheet 2 of 2).

(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 03 DCS									
FIGURE 5 DCS									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-592-1168	05047	AES10M06A .	SCREW, FLANGE HEAD (M6X1.0X20) 020WB4K42	5
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-596-3734	05047	AEW13X250 .	WASHER, LOCK 000GD5A21	1
3	PAFHH	PAFHH	PAFFF	PAFFF	6115-01-588-4725	30554	04-20442 .	CONTROL BOX ASSEMBLY	1
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-33-208-2057	D8286	DIN6923-M6 .	NUT (M6X1)	9
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-597-1379	30554	04-20399 .	HINGE	1
6	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-99-219-7181	I9008	ISO7380-M6 .	SCREW (M6X12) X12-A2-70	9
7	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-21031-5 .	SEAL, EDGE, (MAKE FROM A1512 ON BULK ITEMS LIST)	2
8	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-597-1375	30554	04-20313 .	DOOR	1
9	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-589-9988	S8812	8-325-88 .	LATCH	1
10	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20880 .	BRACKET, SUPPORT	1
11	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-643-2945	05047	AEN16M508 .	NUT, LOCK 000CX0A36	1
12	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-588-9321	3A054	90278A331 .	SCREW, SHOULDER (M5X0.8X12)	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 0301 DCS CONTROL PANEL ASSEMBLY REPAIR PARTS LIST

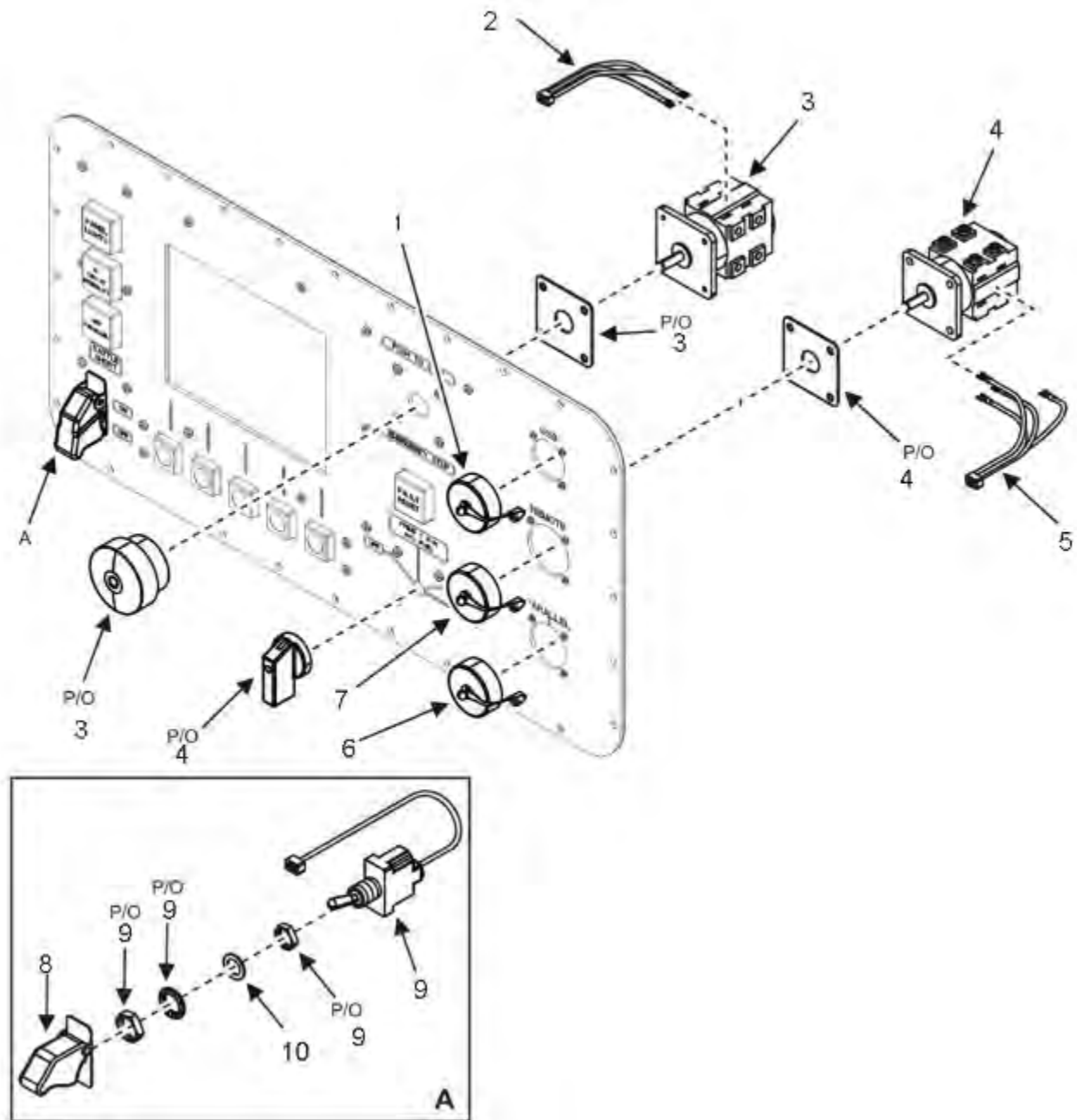


Figure 6. DCS Control Panel Assembly (Sheet 1 of 2).

(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 0301 DCS CONTROL PANEL ASSEMBLY									
FIGURE 6 DCS CONTROL PANEL ASSEMBLY									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-184-7188	81343	MS25043-1 6DA	.. CAP	1
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	6150-01-588-5621	30554	04-20422	.. CABLE ASSEMBLY, EMERGENCY STOP SWITCH	1
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5930-01-619-0979	10983	DKR12US00 94*02*EA	.. SWITCH, EMERGENCY STOP, (INCLUDES GASKET, MOUNTING SCREWS, AND KNOB)	1
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5930-01-587-5396	10983	DHR12US92 06*01EF1	 SWITCH, ENGINE CONTROL, (INCLUDES GASKET, MOUNTING SCREWS, AND KNOB)	1
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ	6150-01-588-5606	30554	04-20421	.. CABLE ASSEMBLY, ENGINE CONTROL SWITCH	1
6	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-590-1601	81343	MS25043-1 8DW	.. CAP	1
7	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-00-221-8620	81343	MS25043-2 0DA	.. CAP	1
8	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5930-00-615-6731	96906	MS25224-1	.. GUARD, SWITCH	1
9	PAFFF	PAFFF	PAFZZ	PAFZZ	5930-01-589-4070	30554	04-20385	.. SWITCH, BATTLESHORT	1
10	PAFZZ	PAFZZ	PAFFF	PAFFF	5310-01-593-5320	5P209	60225	.. RING, SEALING	1
11	PAHZZ	PAHZZ	PAFZZ	PAFZZ	5305-01-596-1447	30554	04-21701	.. SCREW, THREAD-FORMING PAN-HEAD (10-16 TYPE B)	8
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 0302 DCS ENCLOSURE ASSEMBLY REPAIR PARTS LIST

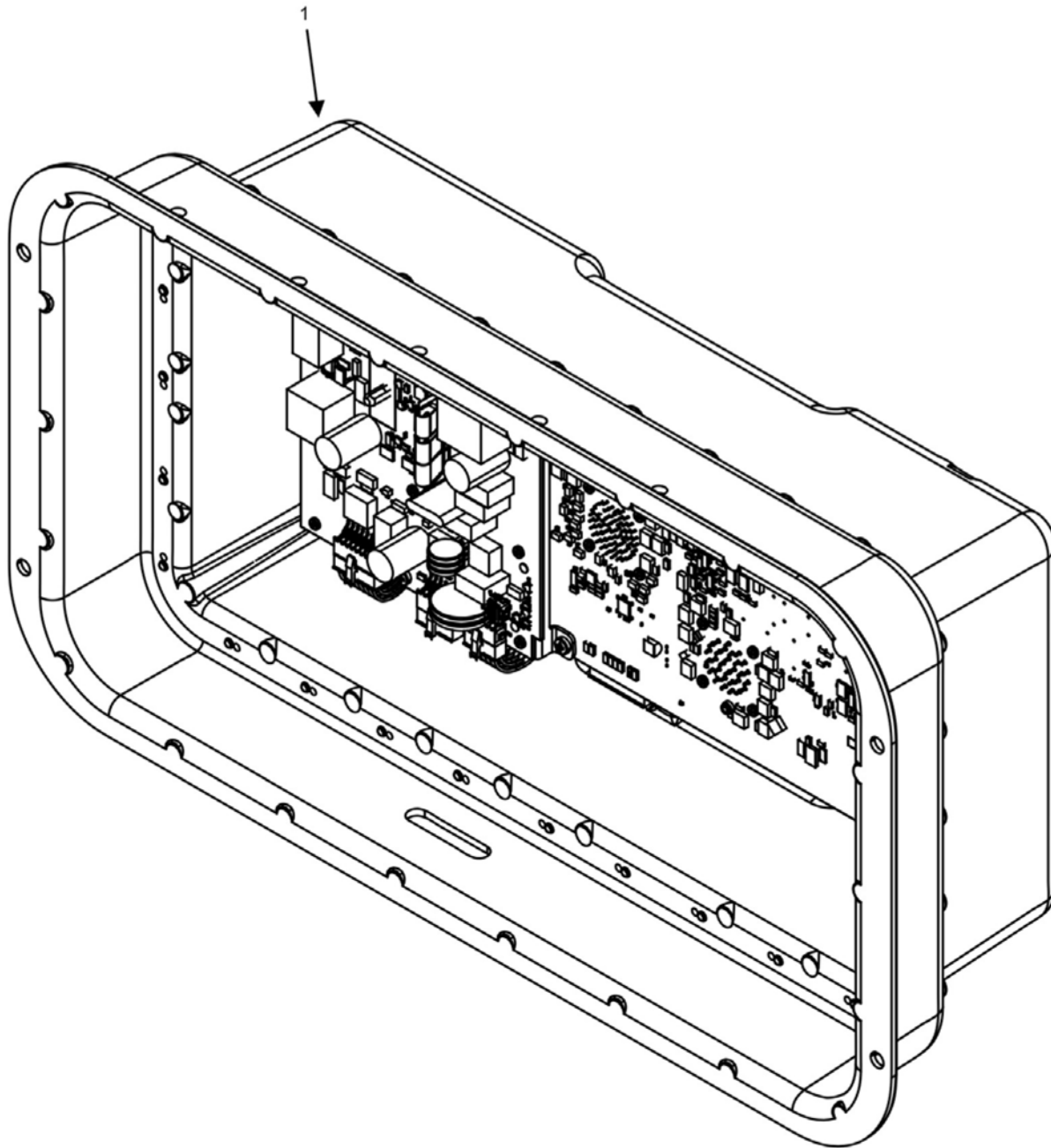


Figure 7. DCS Enclosure Assembly.

(1)	(2)				(3)	(4)	(5)	(6)	(7)
SMR CODE									
	a.	b.	c.	d.					
ITEM	AIR					PART	DESCRIPTION AND		
NO.	ARMY	FORCE	NAVY	USMC	NSN	CAGEC	NUMBER	USABLE ON CODE (UOC)	QTY
							GROUP 0302 DCS ENCLOSURE ASSEMBLY		
							FIGURE 7 DCS ENCLOSURE ASSEM- BLY		
1	XAFHH	XAFHH	XAFF	XAFF		30554	04-20424	. DCS ENCLOSURE ASSEMBLY	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 04 INTAKE AIR REPAIR PARTS LIST

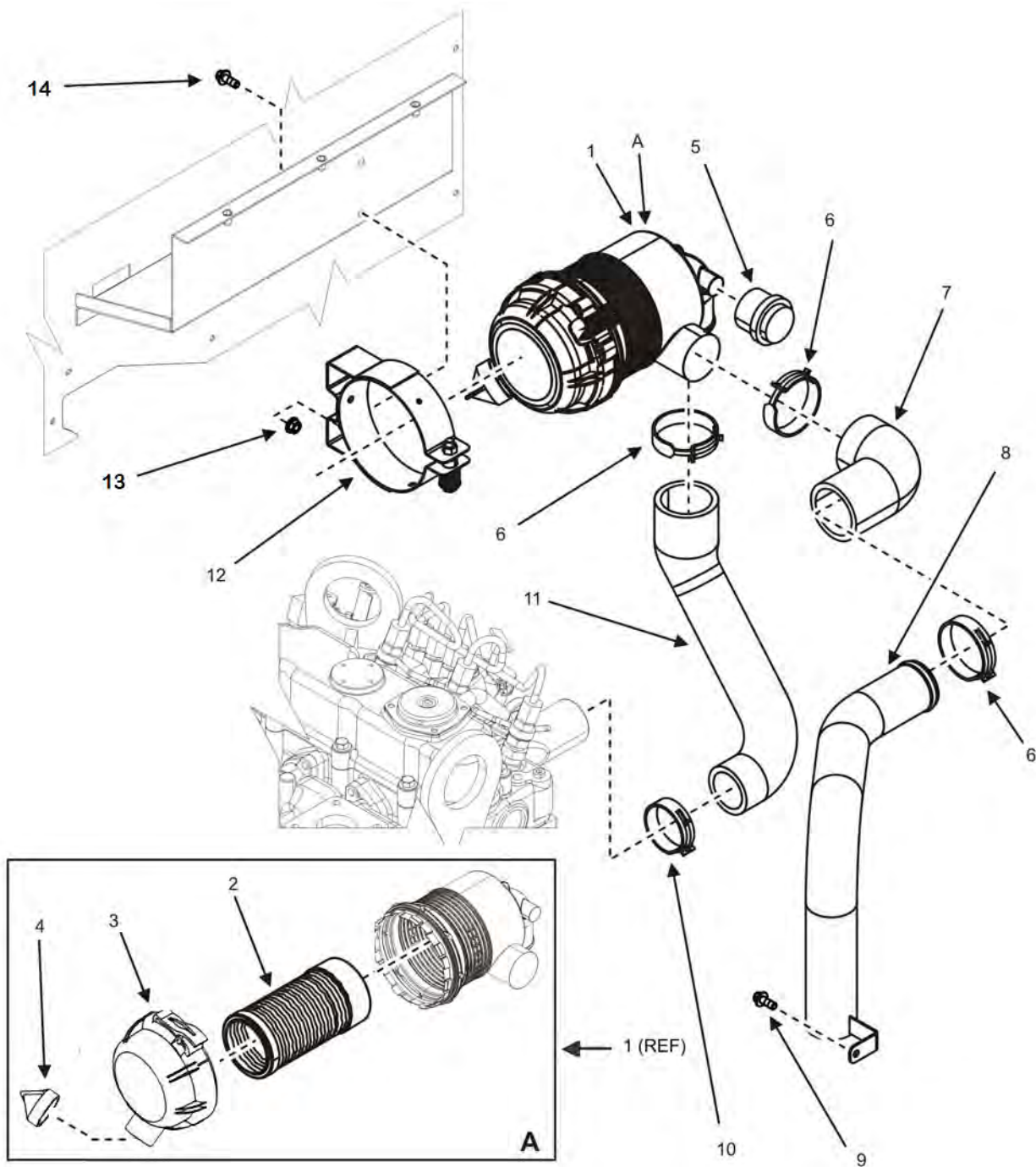


Figure 8. Intake Air.

(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 04 INTAKE AIR									
FIGURE 8 INTAKE AIR									
1	PBFFF	PBFFF	PBFFF	PBFFF	2940-01-588-3663	33457	04-21007	. AIR CLEANER, 4 INCH (INCLUDES ITEM 2 ELEMENT AIR FILTER, ITEM 3 COVER, ASSEMBLY AND ITEM 4 DUST EJECTION VALVE)	1
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2940-01-588-3658	33457	AF26116	. ELEMENT, AIR FILTER	1
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ		33457	3946459 S	. COVER, ASSEMBLY	1
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ		33457	3946457 S	. DUST EJECTION VALVE	1
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4330-01-592-3418	33457	04-20993	. INDICATOR,SERVICE	1
6	PAFZZ	PAFZZ	PAFZZ	PAFZZ		30554	SAEJ1508C TB-67	. CLAMP	3
7	PCFZZ	PCFZZ	PCFZZ	PCFZZ	4730-01-597-9115	30554	04-20672	. ELBOW, HOSE	1
8	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4710-01-597-9188	30554	04-20735	. TUBING, METALLIC	1
9	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-596-3670	05047	AES10M06A 016WB4K42	. SCREW, HEX FLANGEHEAD M6X1X16	1
10	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-597-1015	81343	SAEJ1508C TB-58	. CLAMP	1
11	PCFZZ	PCFZZ	PCFZZ	PCFZZ	4720-01-597-5677	30554	04-20725	. TUBING NONMETALLIC	1
12	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-591-7301	33457	3918199S	. CLAMP, AIR CLEANER	1
13	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-33-208-2057	D8286	DIN6923-M6	. NUT, HEX FLANGE M6X1	2
14	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-596-3576	05047	AES10M08B 020WB4K42	. SCREW, HEX FLANGE HEAD M8X1.25X20	2
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 05 EXHAUST REPAIR PARTS LIST

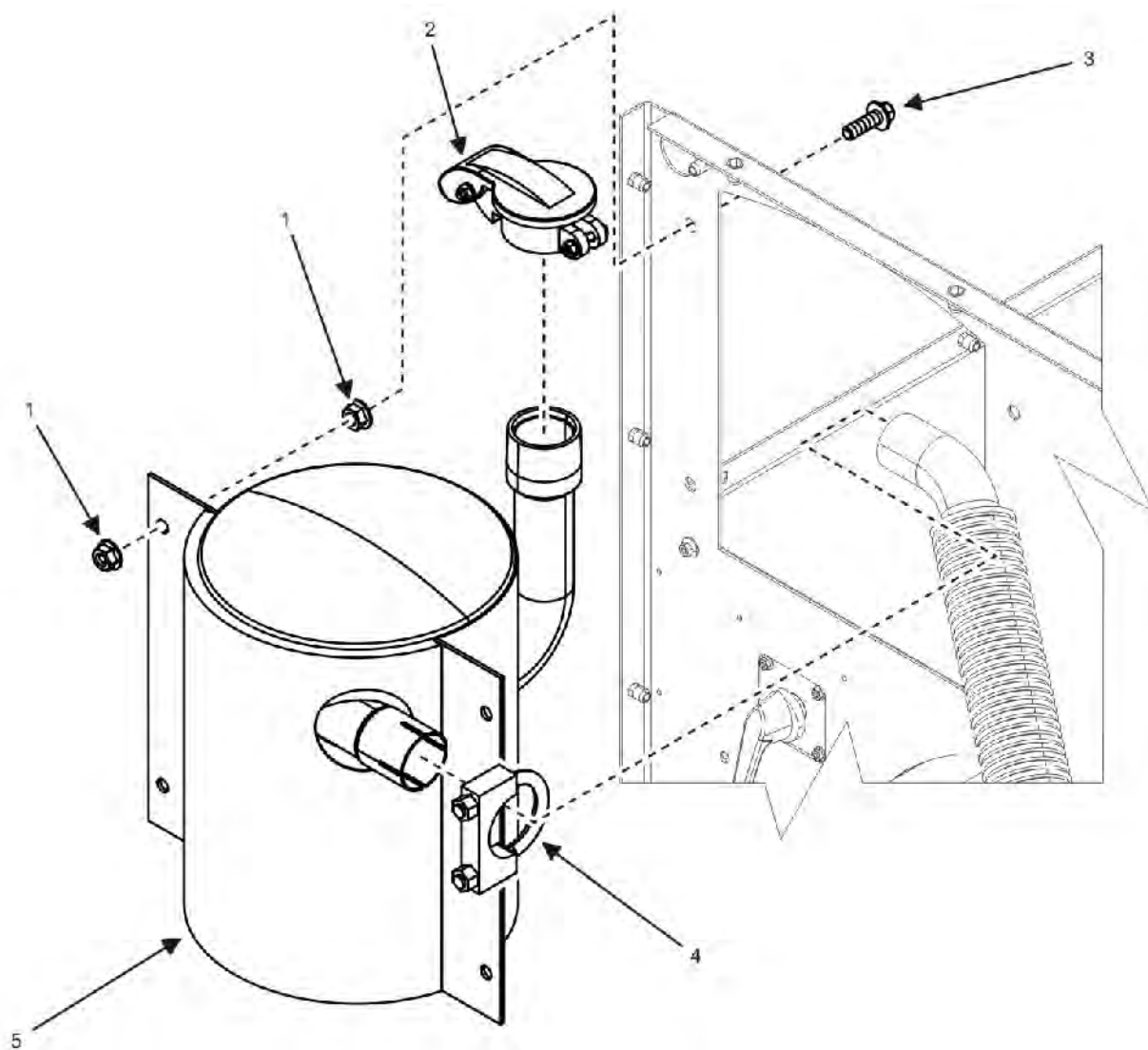


Figure 9. Exhaust (Sheet 1 of 2).

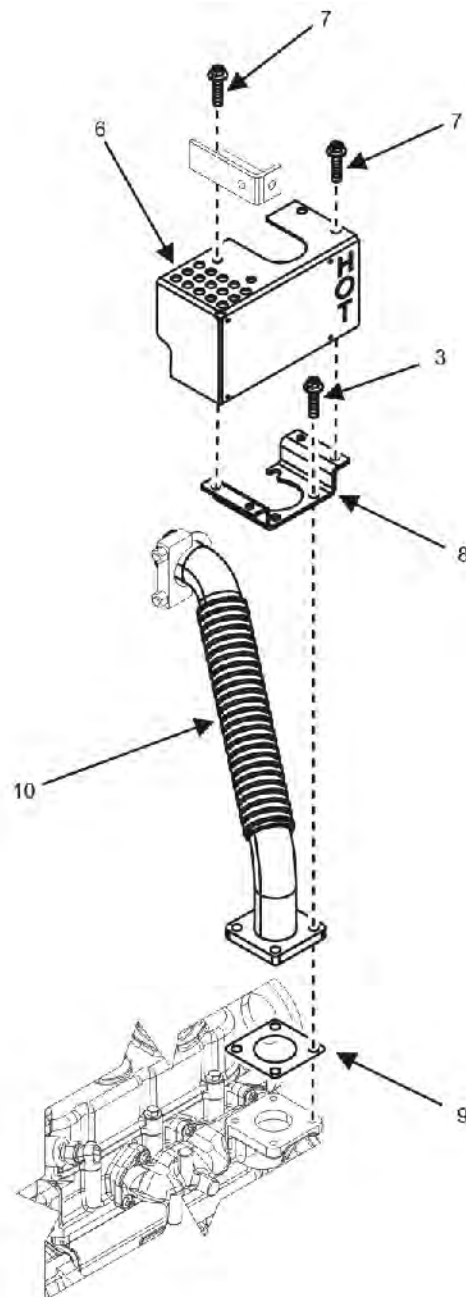


Figure 9. Exhaust (Sheet 2 of 2).

(1)	(2)				(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE				NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
GROUP 05 EXHAUST FIGURE 9 EXHAUST									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-12-318-9539	D8286	DIN6923-M8 -8-A2P	. NUT, HEX FLANGE (M8X1.25)	8
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-593-5321	30554	04-210383-3	. CAP, RAIN EXHAUST	1
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-596-3693	05047	AES10M08B 025WB4K42	. SCREW, HEX FLANGE HEAD (M8X1.25X25)	8
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-593-8291	30554	04-21041-1	. CLAMP, LOOP	1
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2990-01-598-9708	4NWG5	202229A	. MUFFLER	1
6	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5999-01-591-5666	30554	04-21321	. SHIELD, HEAT	1
7	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-596-3670	05047	AES10M06A 016WB4K42	. SCREW, HEX FLANGE HEAD (M6X1X16)	4
8	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21338	. BRACKET, SUPPORT	1
9	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5330-01-446-2136	1Q0C4	15263-1237 -0	. GASKET, EXHAUST	1
10	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4710-01-597-5307	30554	04-20736	. PIPE, EXHAUST	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 06 COOLING SYSTEM REPAIR PARTS LIST

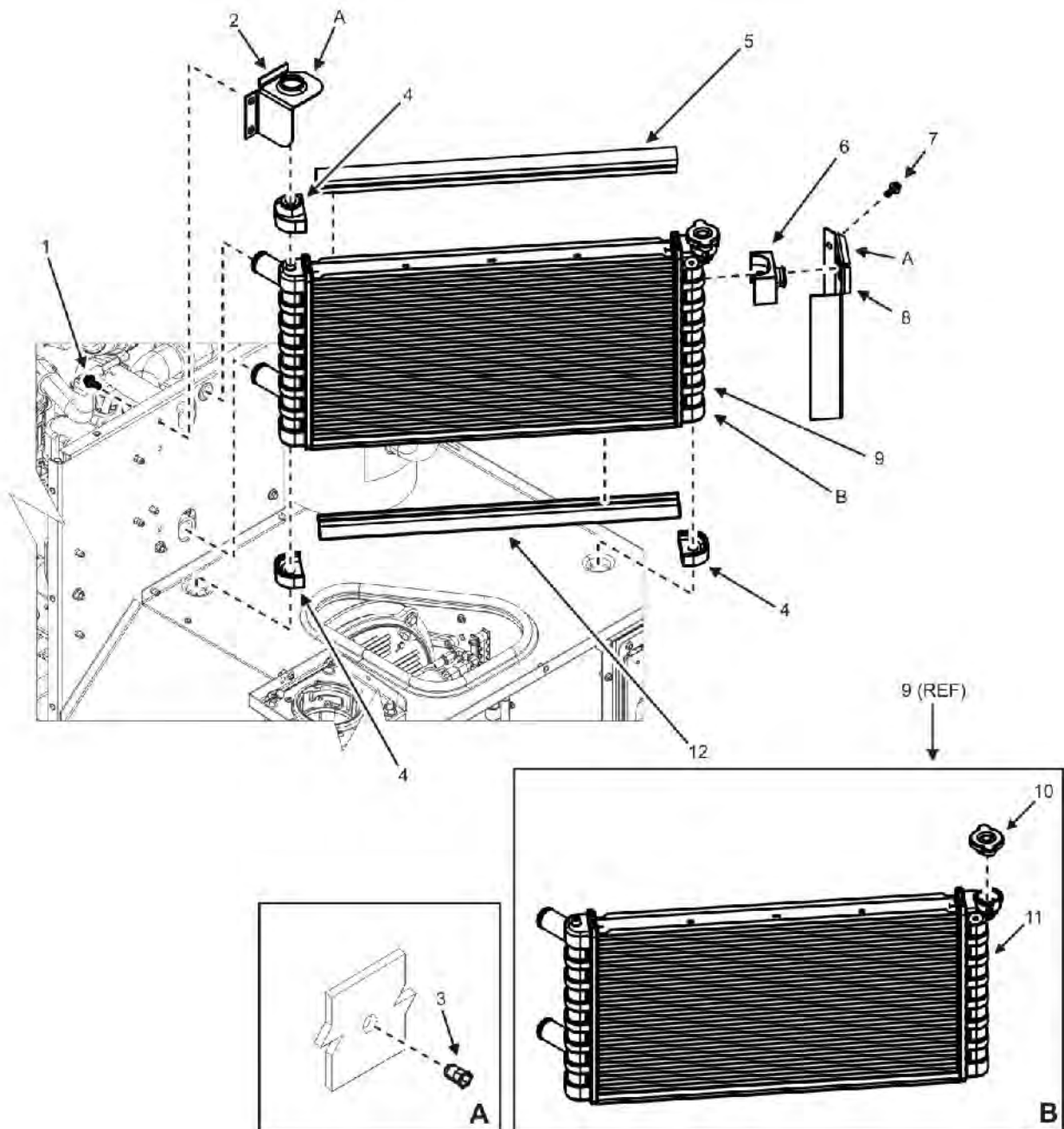


Figure 10. Cooling System (Sheet 1 of 4).

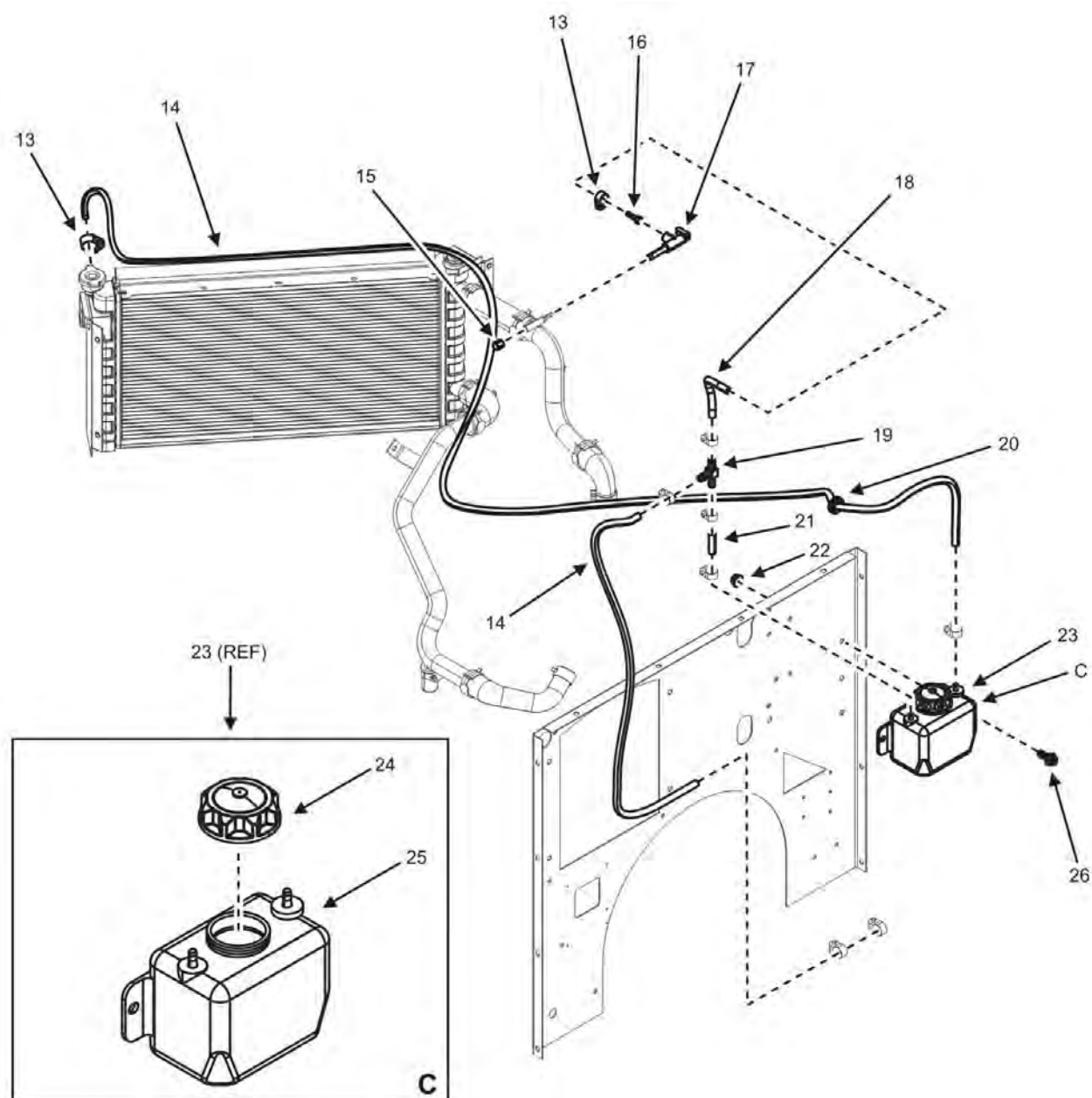


Figure 10. Cooling System (Sheet 2 of 4).

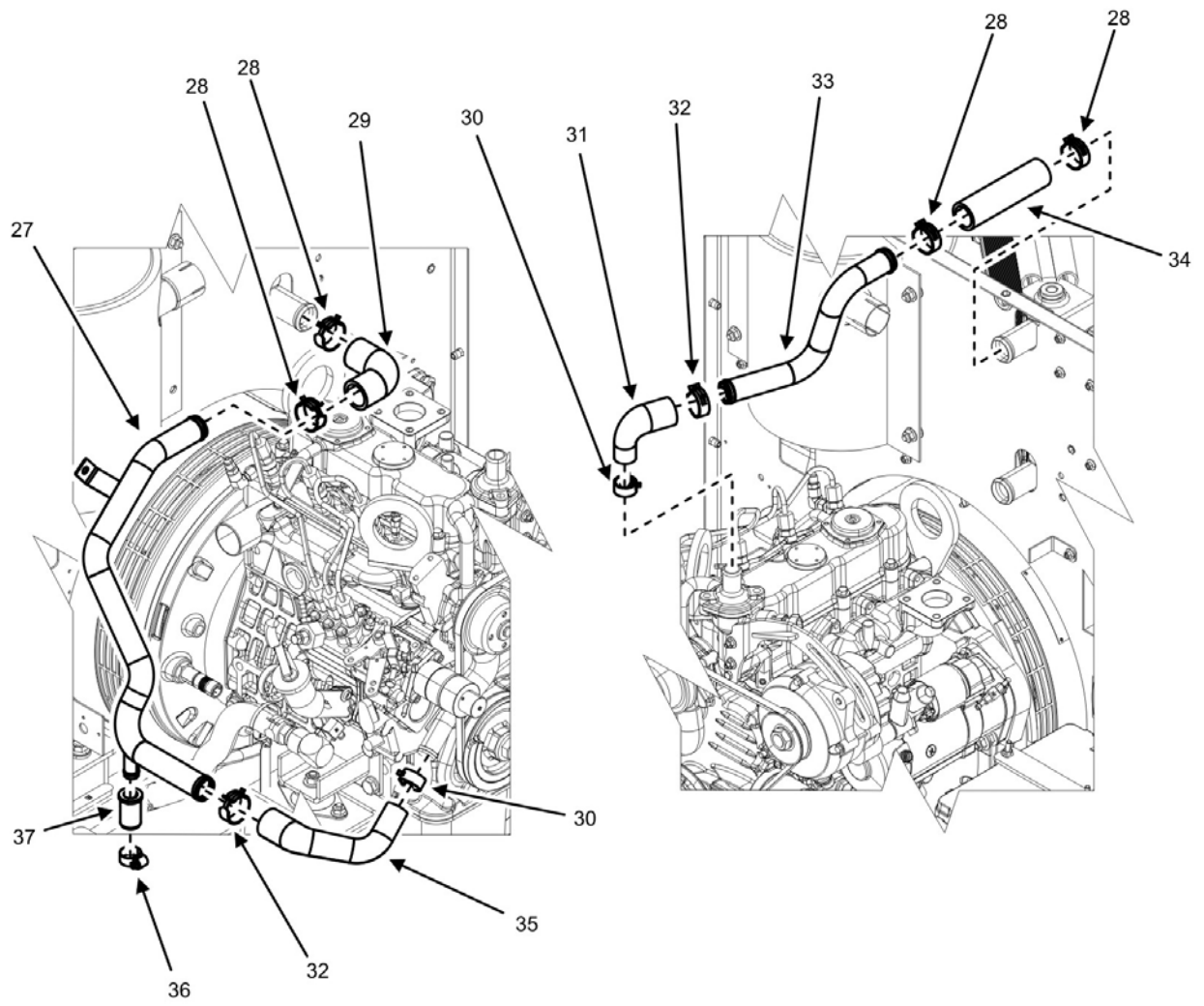


Figure 10. Cooling System (Sheet 3 of 4).

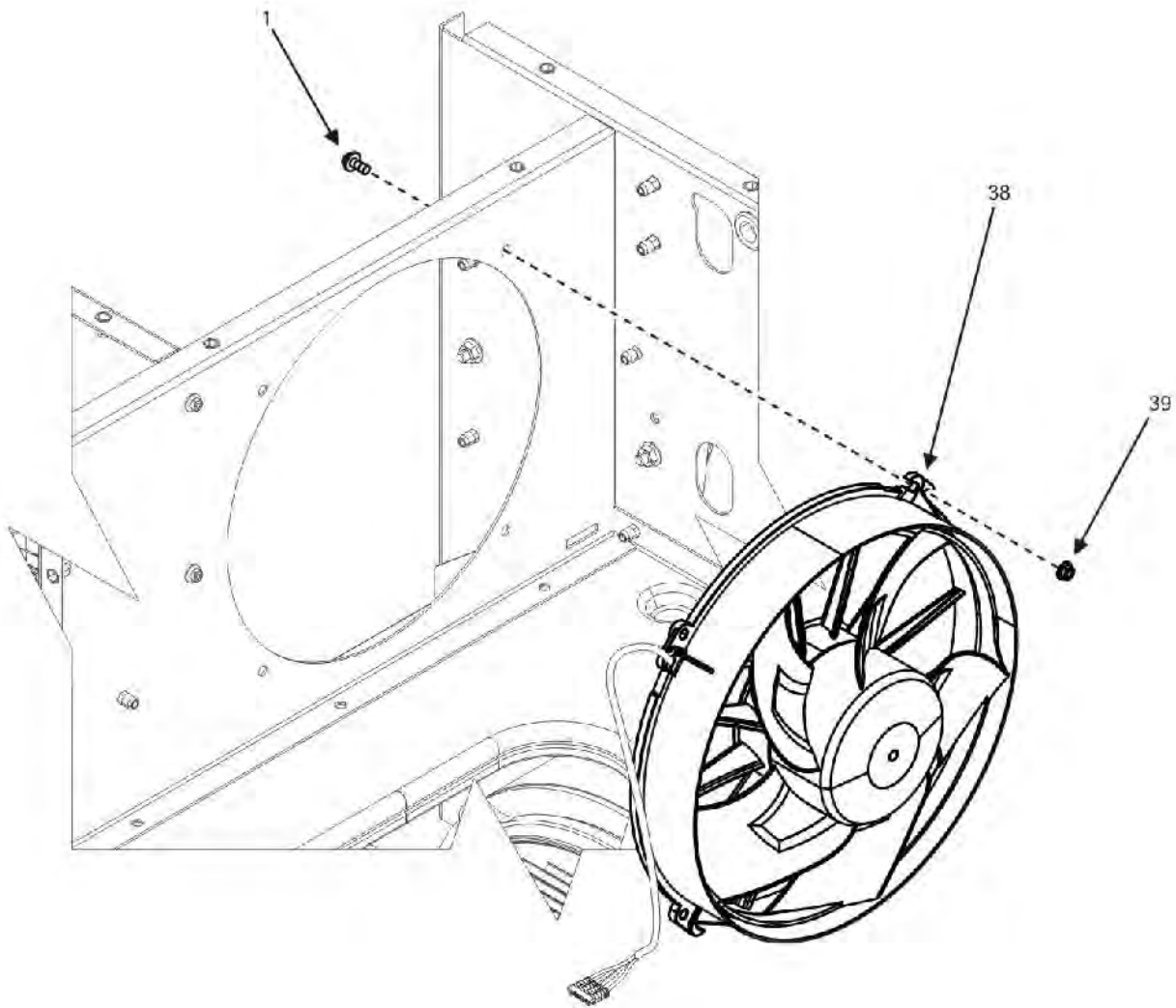


Figure 10. Cooling System (Sheet 4 of 4).

(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 06 COOLING SYSTEM									
FIGURE 10 COOLING SYSTEM									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-596-3670	05047	AES10M06A 016WB4K42	. SCREW, HEX FLANGE HEAD M6X1X16	6
2	XBFFZ	XBFFZ	XBFFZ	XBFFZ		30554	04-20997	. BRACKET, RADIATOR	1
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-589-3727	3A2G6	39101-7603 0	. . NUT, PLAIN, CLINCH	4
4	PCFZZ	PCFZZ	PCFZZ	PCFZZ	5340-01-593-2746	30554	04-20832	. MOUNT, RADIATOR	3
5	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-21030-1	. SEAL, EDGE, (MAKE FROM 04-20868 ON BULK ITEMS LIST, CUT TO LENGTH 550±5 MM)	2
6	PCFZZ	PCFZZ	PCFZZ	PCFZZ	5340-01-593-2748	30554	04-20833	. MOUNT, RADIATOR	1
7	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-595-7637	4M343	44832	. SCREW, FLANGE HEAD M6X1.0X16 ..	2
8	XBFFF	XBFFF	XBFFF	XBFFF		30554	04-20916	. BRACKET, RADIATOR	1
9	PAFFF	PAFFF	PAFFF	PAFFF	2930-01-590-8522	30554	04-21037	. RADIATOR ASSEMBLY	1
10	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-641-3848	44940	A049E817	. . CAP, FILLER, OPENING	1
11	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2930-01-595-9350	44940	0130-8255-2 -010L	. . RADIATOR	1
12	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-21031-1	. SEAL, EDGE, (MAKE FROM A1512 ON BULK ITEMS LIST, CUT TO LENGTH 550±5 MM)	2
13	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-00-871-6729	61424	6202	. CLAMP, HOSE	9
14	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-21070-3	. HOSE, VENT RADIATOR, (MAKE FROM 3058529 ON BULK ITEM LIST, CUT TO LENGTH 1,050±10 MM)	2
15	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-588-8328	3A054	9171KZ4104 -21572	. CAP, PIPE	1
16	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-00-595-1078	93061	125HBL-4-2	. FITTING, HOSE BARB	1
17	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4820-01-367-1836	30554	88-21633	. VALVE, CHECK	1
18	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-21070-4	. HOSE, VENT RADIATOR, (MAKE FROM 3058529 ON BULK ITEMS LIST) .	1
19	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-592-6772	30554	04-21502	. FITTING, TEE	1
20	PCFZZ	PCFZZ	PCFZZ	PCFZZ	5325-00-185-0001	96906	MS35489-46	. GROMMET	1
21	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-21070-5	. HOSE, VENT RADIATOR, (MAKE FROM BULK ITEMS LIST 3058529, CUT TO LENGTH 50±10 MM)	1

(1)	(2)				(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE				NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
22	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-12-318-9539	30554	DIN 6923-M 8X1.25	. NUT, HEX FLANGE M8X1.25	2
23	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5430-01-595-5961	0E3E3	070506	. TANK, COOLANT ASSEMBLY	1
24	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2930-01-588-2852	0E3E3	080061BE	. . CAP, COOLANT	1
25	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5430-01-633-6801	0E3E3	070313	. . TANK, COOLANT	1
26	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-596-3576	05047	AES10M08B 020WB4K42	. SCREW, HEX FLANGE HEAD M8X1.25X20	2
27	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4710-01-597-5962	30554	04-20733	. TUBE, WATER LOWER	1
28	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-596-7242	81343	SAEJ1508C TB-42	. CLAMP, HOSE	4
29	PCFZZ	PCFZZ	PCFZZ	PCFZZ	4730-01-597-5658	30554	04-20724	. ELBOW, COOLANT HOSE	1
30	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-642-5869	81343	SAEJ1508C TB-30	. CLAMP	2
31	PCFZZ	PCFZZ	PCFZZ	PCFZZ	4730-01-597-5709	30554	04-20726	. ELBOW, COOLANT HOSE	1
32	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-596-7242	81343	SAEJ1508C TB-42	. CLAMP, HOSE	2
33	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4710-01-597-5963	30554	04-20734	. TUBE, WATER UPPER	1
34	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-20727	. HOSE, COOLANT, (MAKE FROM 04-20577 ON BULK ITEMS LIST, CUT TO LENGTH 153±3 MM)	1
35	PCFZZ	PCFZZ	PCFZZ	PCFZZ	4720-01-597-5983	30554	04-20723	. ELBOW, COOLANT	1
36	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-596-7215	81343	SAEJ1508C TB-27	. CLAMP, HOSE	1
37	PCFZZ	PCFZZ	PCFZZ	PCFZZ	5340-01-595-3493	30554	04-21393	. CAP, TUBE	1
38	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2930-01-600-3133	30554	04-20999	. FAN, ENGINE COOLING	1
39	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-33-208-2057	D8286	DIN6923-M6	. NUT, HEX FLANGE M6X1	4
END OF FIGURE									

**FIELD AND SUSTAINMENT MAINTENANCE
GROUP 07 FUEL SYSTEM REPAIR PARTS LIST**

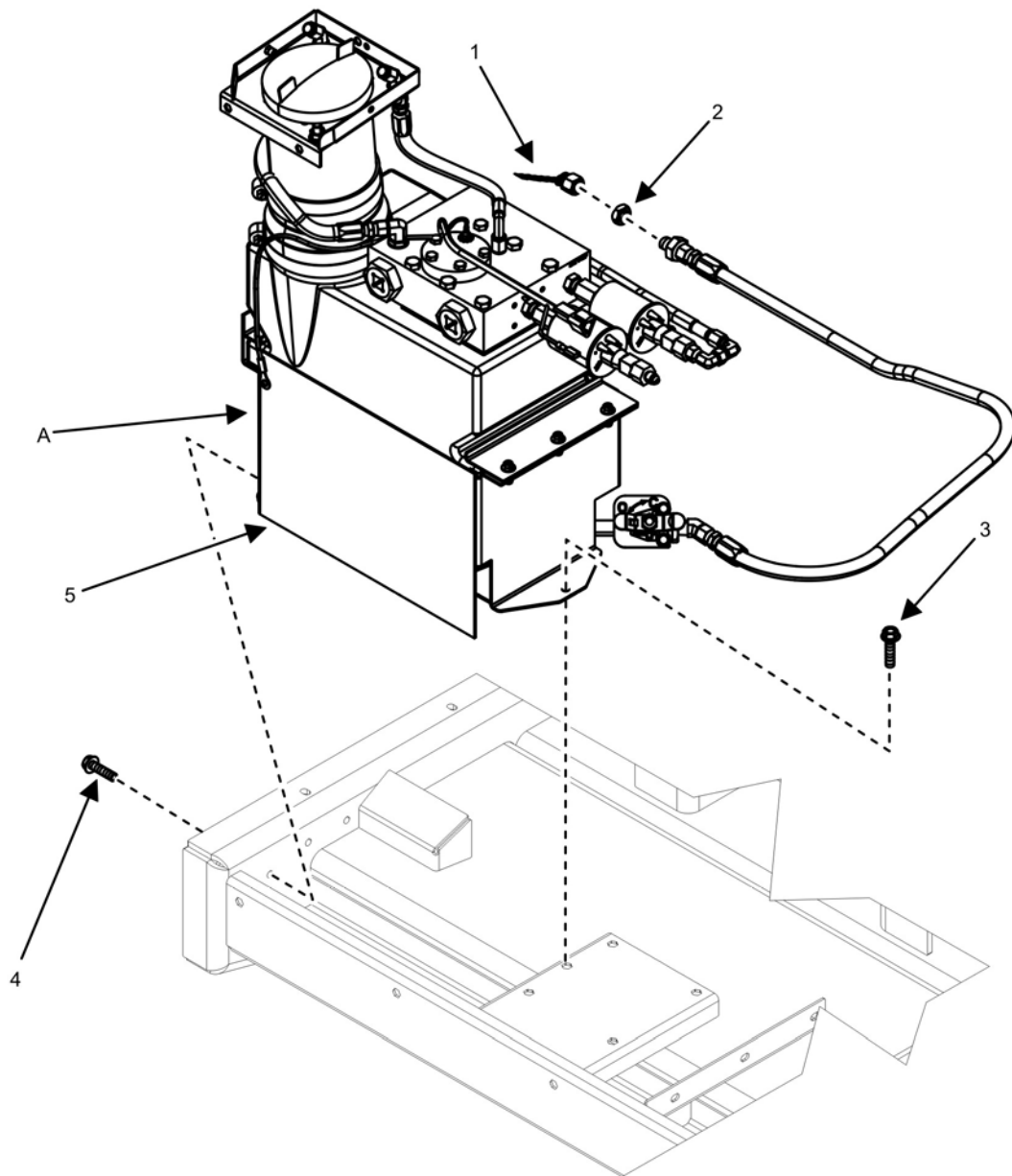


Figure 11. Fuel System (Sheet 1 of 6).

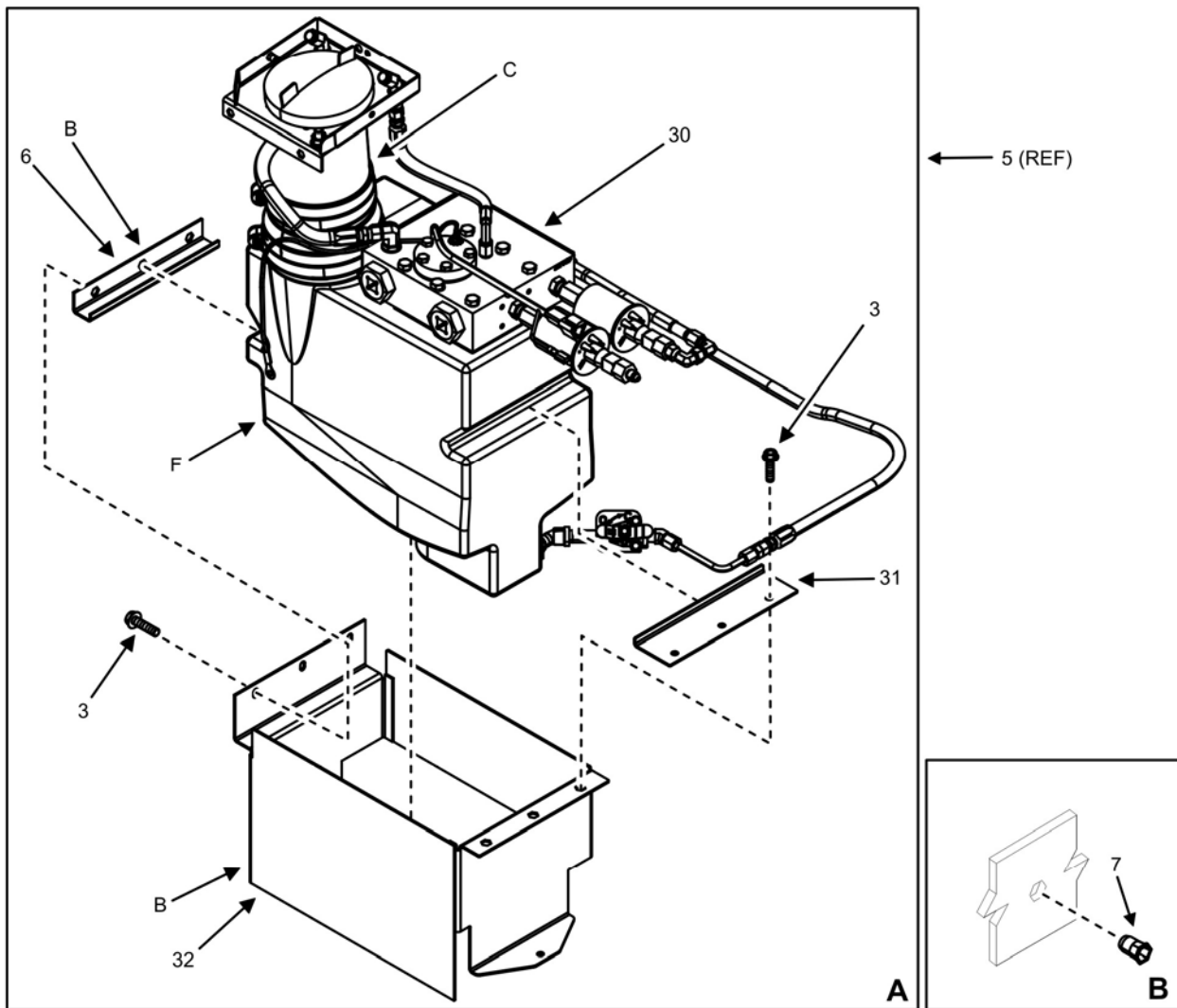


Figure 11. Fuel System (Sheet 2 of 6).

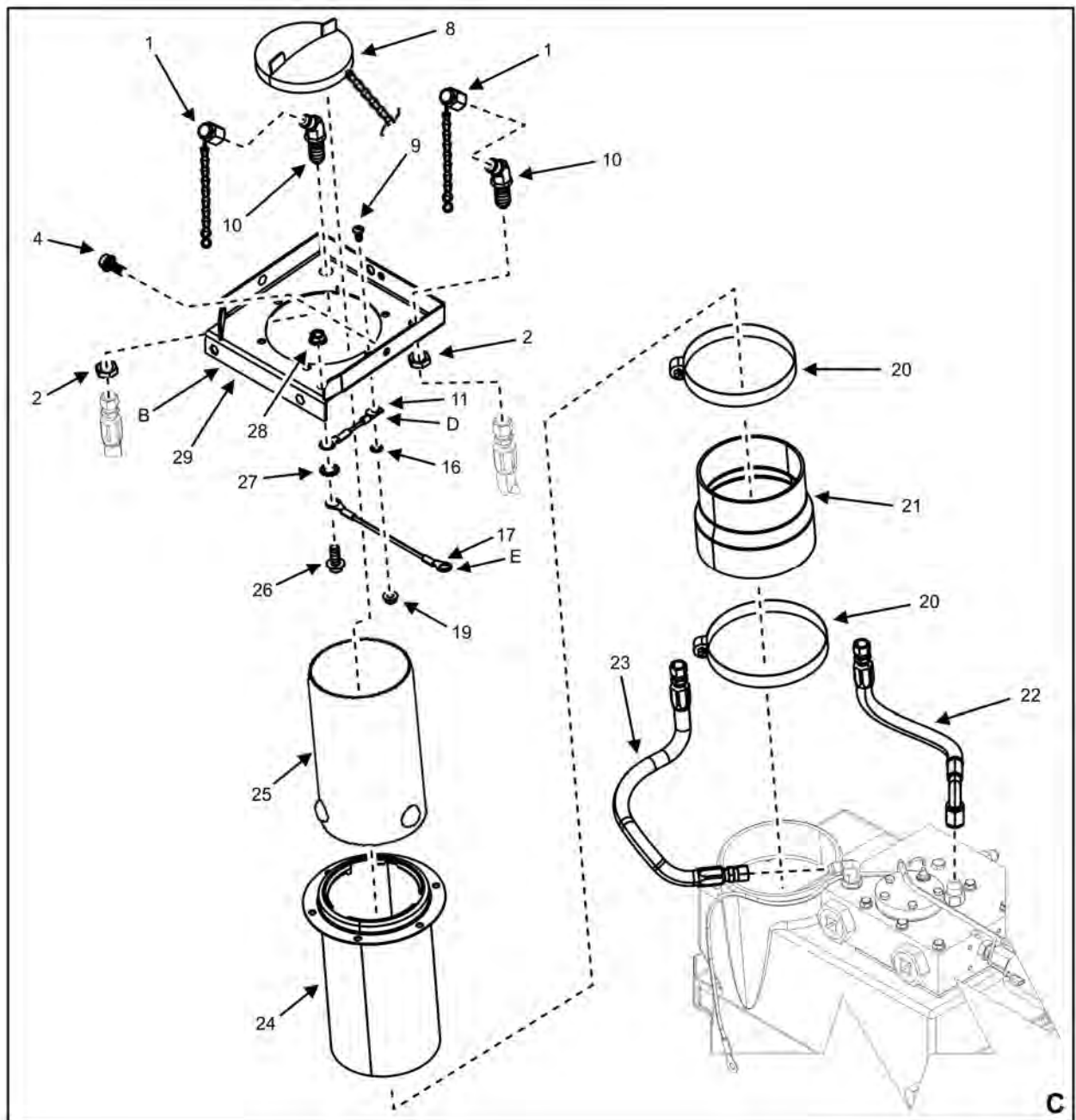


Figure 11. Fuel System (Sheet 3 of 6).

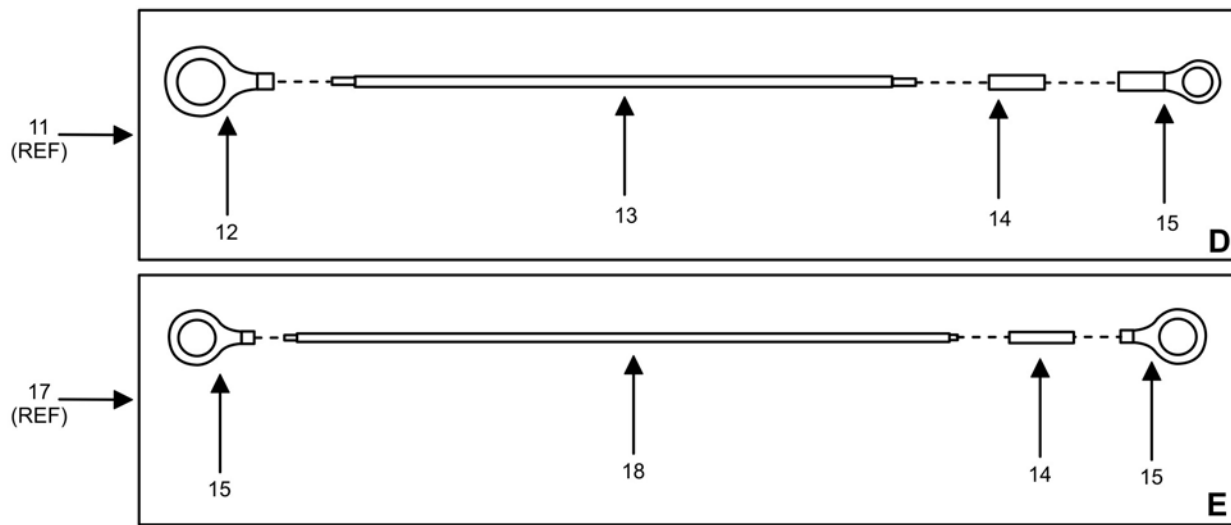


Figure 11. Fuel System (Sheet 4 of 6).

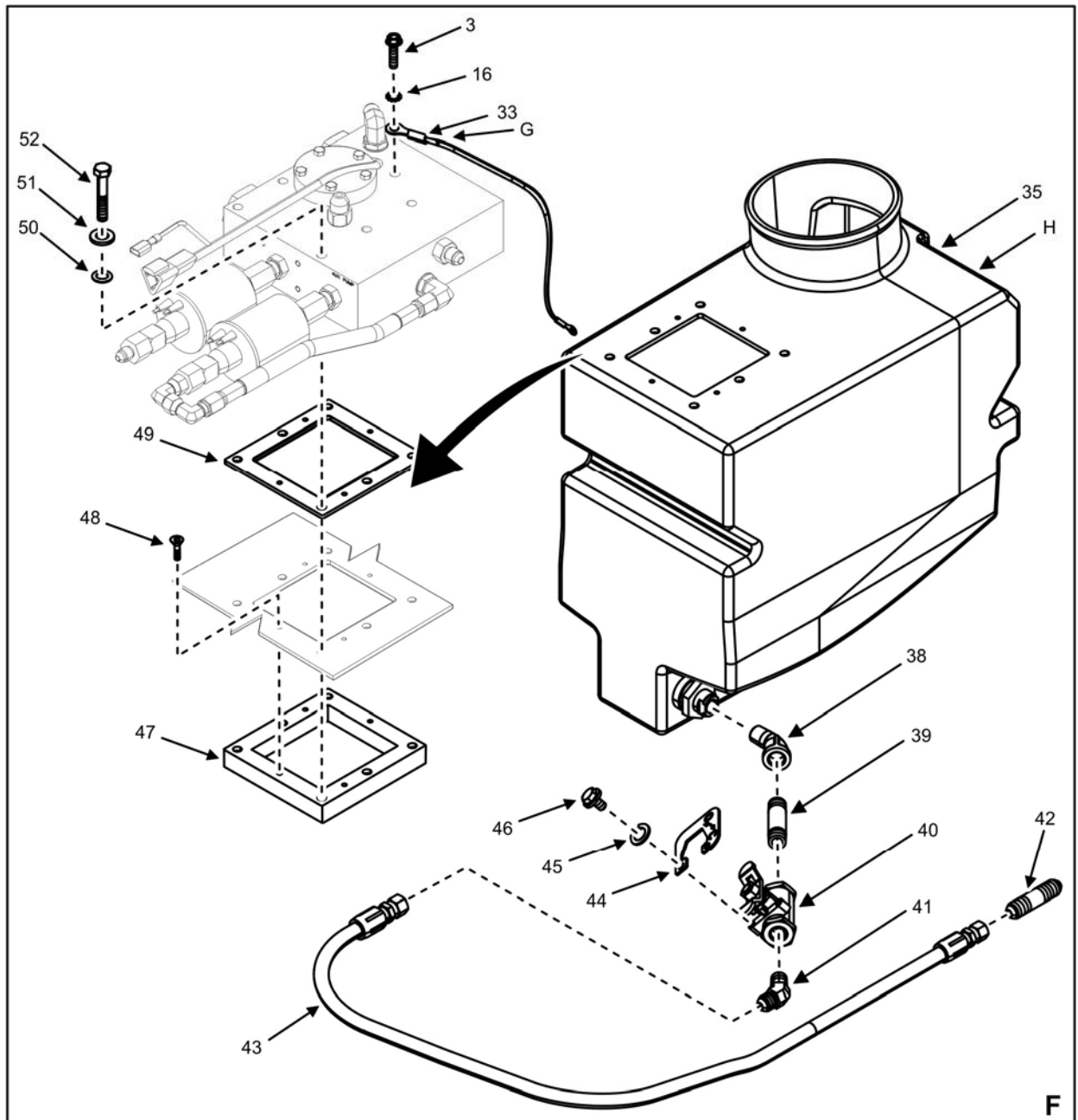


Figure 11. Fuel System (Sheet 5 of 6).

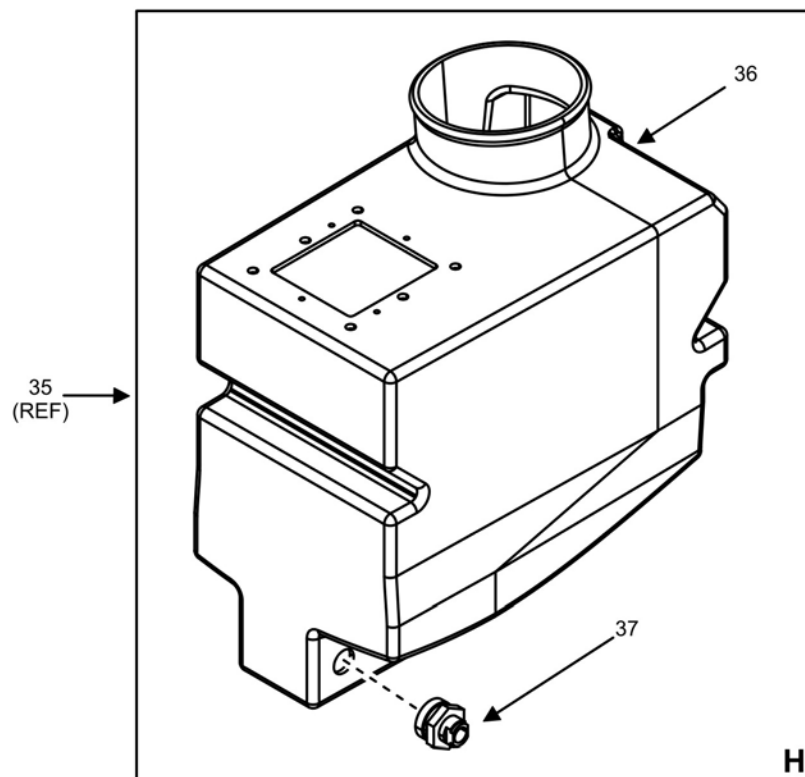
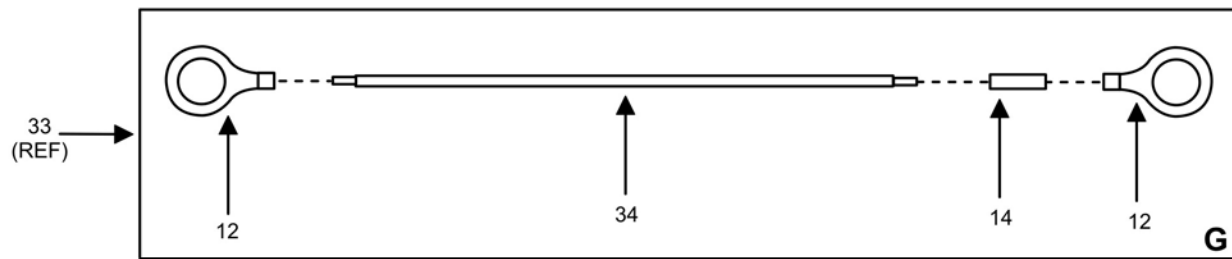


Figure 11. Fuel System (Sheet 6 of 6).

(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 07 FUEL SYSTEM									
FIGURE 11 FUEL SYSTEM									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-597-9059	30554	04-21043	. CAP, TUBE	3
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-597-1527	81343	SAEJ51450 70118C	. NUT, HEX JAM 1/2-20 IN	3
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-596-3670	05047	AES10M06A 016WB4K42	. SCREW, HEX FLANGE HEAD M6X1X6	8
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-595-7637	4M343	44832	. SCREW	3
5	XCFFF	XCFFF	XCFFF	XCFFF		30554	04-20377	. FUEL SYSTEM ASSEMBLY 5KW	1
6	XBFFF	XBFFF	XBFFF	XBFFF		30554	04-20793	. . BRACKET, FUEL SUPPORT SYSTEM	1
7	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-589-3727	3A2G6	39101-7603 0	. . . NUT, CLINCH M6X1.0 HEXSERT	9
8	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2590-00-141-9758	96906	MS35645-1	. . CAP, FILLER OPENING	1
9	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-99-219-7181	I9008	ISO7380-M6 X12-A2-70	. . SCREW, SOCKET HEAD BUTTON M6X1X12	6
10	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-597-9421	81343	SAEJ51450 70801B	. . FITTING, TUBE ELBOW 45, 1/2-20 IN	2
11	XBFFF	XBFFF	XBFFF	XBFFF		30554	04-21153-1	. . CABLE, ELECTRICAL GROUND	1
12	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-00-113-9828	96906	MS25036-1 48	. . . TERMINAL, RING M6, 12-10 AWG ...	3
13	MFFZZ	MFFZZ	MFFZZ	MFFZZ		0X4C9	04-21158	. . . WIRE, STRANDED 12 AWG, (MAKE FROM 3271-12-65 ON BULK ITEMS LIST CUT TO LENGTH 150±25 MM)	1
14	XBZZZ	XBZZZ	XBZZZ	XBZZZ		30554	04-20556-9	. . . LAMINATE, LABEL COVER	1
15	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-01-158-9913	30554	04-21154	. . . TERMINAL, RING M10, 12-10 AWG .	3
16	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-596-3734	05047	AEW13X250 000GD5A21	. . WASHER, LOCK 1/4 EXTERNAL TOOTH	2
17	XBFFF	XBFFF	XBFFF	XBFFF		30554	04-21153-3	. . CABLE, ELECTRICAL GROUND	1
18	MFFZZ	MFFZZ	MFFZZ	MFFZZ		0X4C9	04-21158	. . . WIRE, STRANDED 12 AWG, (MAKE FROM 3271-12-65 ON BULK ITEMS LIST CUT TO LENGTH 1,920±25 MM) ...	2
19	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-33-208-2057	D8286	DIN6923-M6	. . NUT, HEX FLANGE M6X1	6
20	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-596-6649	81343	SAEJ1508F 72	. . CLAMP	2
21	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-589-3753	30554	04-21352	. . COUPLING, HOSE	1

(1) ITEM NO.	(2) SMR CODE				(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
22	PAFZZ	PAFZZ	PCFZZ	PAFZZ	4720-01-633-6914	30554	04-20767-26	.. LINE, FUEL	1
23	PAFZZ	PAFZZ	PCFZZ	PAFZZ	4720-01-593-8806	30554	04-20767-25	.. LINE, FUEL	1
24	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20202	.. MODULE, FUEL FILLER NECK	1
25	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4710-01-596-6464	30554	04-20203	.. TUBE, FUEL FILL	1
26	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-642-5761	05047	AES10C025 CZ7A32	.. SCREW, HEX FLANGE HEAD M10X1.5X25	1
27	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-601-9478	05047	AEW20M01 0000DB8A 31	.. WASHER, LOCK M10 EXTERNAL TOOTH	1
28	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-631-4272	05047	AEN18M10 C000DG8A 31	.. NUT, HEX FLANGE HEAD M10X1.5 STAINLESS	1
29	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20744	.. BRACKET, FUEL SYSTEM	1
30	XBFFF	XBFFF	XBFFF	XBFFF		30554	04-20615	.. MODULE, FUEL SYSTEM, (SEE FIG- URE 12 FOR PARTS BREAKDOWN)	1
31	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20792	.. BRACKET, FUEL SUPPORT SYSTEM	1
32	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20829	.. SUPPORT, FUEL SYSTEM 5 KW	1
33	XBFFF	XBFFF	XBFFF	XBFFF		30554	04-21153-13	.. CABLE, ELECTRICAL GROUND	1
34	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-21158	... WIRE, STRANDED 12 AWG, (MAKE FROM 3271-12-65 ON BULK ITEMS LIST CUT TO LENGTH 225±25 MM)	1
35	PAFFF	PAFFF	PAFFF	PAFFF	2910-01-275-1749	1DS87	84-13000	.. TANK ASSEMBLY, FUEL 5 KW	1
36	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2910-01-595-9558	30554	04-20501	... TANK, FUEL 5 KW ... Use This	1
37	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-589-0851	0JPL8	P35900661	... FITTING BULKHEAD, 1/4-18 NPT PORT	1
38	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-00-911-5707	81343	SAE J514 4- 4 140339C	.. ELBOW PIPE	1
39	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-597-9388	30554	04-20861	.. FITTING, PIPE NIPPLE 1/4 IN NPT X 38.1 MM LONG	1
40	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4820-01-589-1015	30554	04-20752	.. VALVE, BALL 1/4 FEMALE NPT	1
41	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-00-113-0567	81343	SAE J514 5- 4 070302C	ELBOW 1/4-NPT X 1/2-20	1
42	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-597-9421	81343	SAEJ51450 70601B	.. CONNECTOR, TUBE BULKHEAD, 1/2-20 IN JIC FLARE	1
43	PCFZZ	PCFZZ	PCFZZ	PCFZZ	4720-01-597-6349	30554	04-20767-29	.. LINE, FUEL	1
44	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4310-01-597-5318	30554	04-21210	.. PLATE, VALVE	1

(1)	(2)				(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE				NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
45	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-164-8542	D9182	DIN127-M6	.. WASHER, LOCK (M6)	2
46	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-598-7757	05047	AESZAC190 375WA1FY1	.. SCREW HEX HEAD 10-24X3/8 IN	2
47	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5330-01-593-2769	30554	04-20535	.. RETAINER, GASKET FUEL SYSTEM	1
48	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-620-9474	05047	AES47M407 016DG6CP2	.. SCREW, FLAT HEAD	2
49	PCFZZ	PCFZZ	PCFZZ	PCFZZ	5330-01-597-1377	30554	04-20536	.. GASKET, FUEL SYSTEM	1
50	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-596-0059	4JMM9	RS62200	.. WASHER, SEALING	6
51	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-619-8688	05047	AEW25X266 062EA1AF1	.. WASHER-FLAT 1/4	6
52	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-596-3644	05047	AES07M06A 070WB4AA1	.. SCREW-HHC M6X1X70	6
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 0701 FUEL MANIFOLD ASSEMBLY REPAIR PARTS LIST

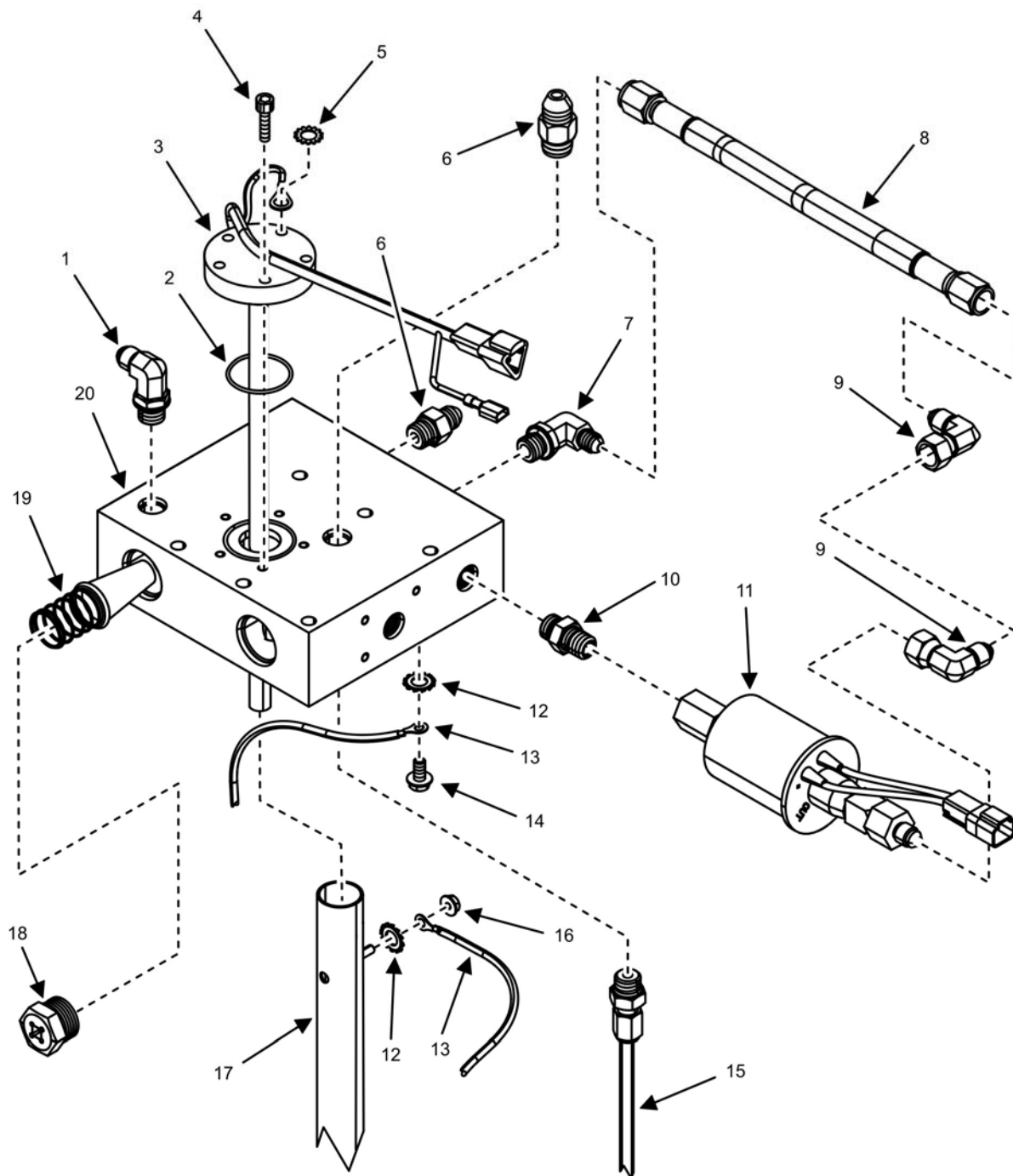


Figure 12. Fuel Manifold Assembly.

(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 0701 FUEL MANIFOLD ASSEMBLY FIGURE 12 FUEL MANIFOLD ASSEMBLY									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-007-5234	81343	SAE J514 5-6 070220C	. FITTING, TUBE ELBOW	1
2	PCFZZ	PCFZZ	PCFZZ	PCFZZ	5331-01-609-0754	81343	SAE J515 C H 290 X038 6H	. SEAL, O-RING	1
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2910-01-651-8466	30554	04-21917-3	. SENSOR, FUEL LEVEL	1
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-641-5048	D8286	DIN931-M5 X30	. SCREW, HEX HEAD M5X0.8X30	5
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-619-8939	05047	AEW22X190 000EA1AA1	. WASHER, LOCK EIT #10	1
6	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-208-9235	81343	SAEJ5145-6 070120C	. FITTING, CONNECTOR	2
7	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-242-4510	81343	SAE J514 4-6 070220C	. FITTING, TUBE ELBOW	1
8	PCFZZ	PCFZZ	PCFZZ	PCFZZ	4720-01-596-6552	30554	04-20053	. LINE, FUEL	1
9	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5975-01-590-6706	44940	SAEJ51440 70221C	. FITTING, ELBOW	2
10	XAFZZ	XAFZZ	XAFZZ	XAFZZ		81343	SAEJ5146-4 080102C	. FITTING, CONNECTOR	2
11	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4320-01-587-0865	44940	04-20002	. PUMP, FUEL, ELECTRIC	2
12	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-596-3734	05047	AEW13X250 000GD5A21	. WASHER, LOCK 1/4 EXT TOOTH	2
13	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5999-01-588-3447	30554	04-21318-2	. LEAD, ELECTRICAL GROUND	2
14	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-596-3670	05047	AES10M06A 016WB4K42	. SCREW, HEX FLANGE HEAD M6X1X16	1
15	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20623	. TUBE, FUEL	2
16	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-33-208-2057	D8286	DIN6923-M6	. NUT, HEX FLANGE M6X1	1
17	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20619	. PIPE, FUEL 5 KW	1
18	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5365-01-597-1376	30554	04-20406	. PLUG, THREADED	2
19	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-596-6452	30554	04-20618	. STRAINER, FUEL	2

(1)	(2)				(3)	(4)	(5)	(6)	(7)
SMR CODE									
	a.	b.	c.	d.					
ITEM	AIR					PART	DESCRIPTION AND		
NO.	ARMY	FORCE	NAVY	USMC	NSN	CAGEC	NUMBER	USABLE ON CODE (UOC)	QTY
20	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20534	. MANIFOLD, FUEL	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE

GROUP 0702 FUEL FILTER/WATER SEPARATOR ASSEMBLY REPAIR PARTS LIST

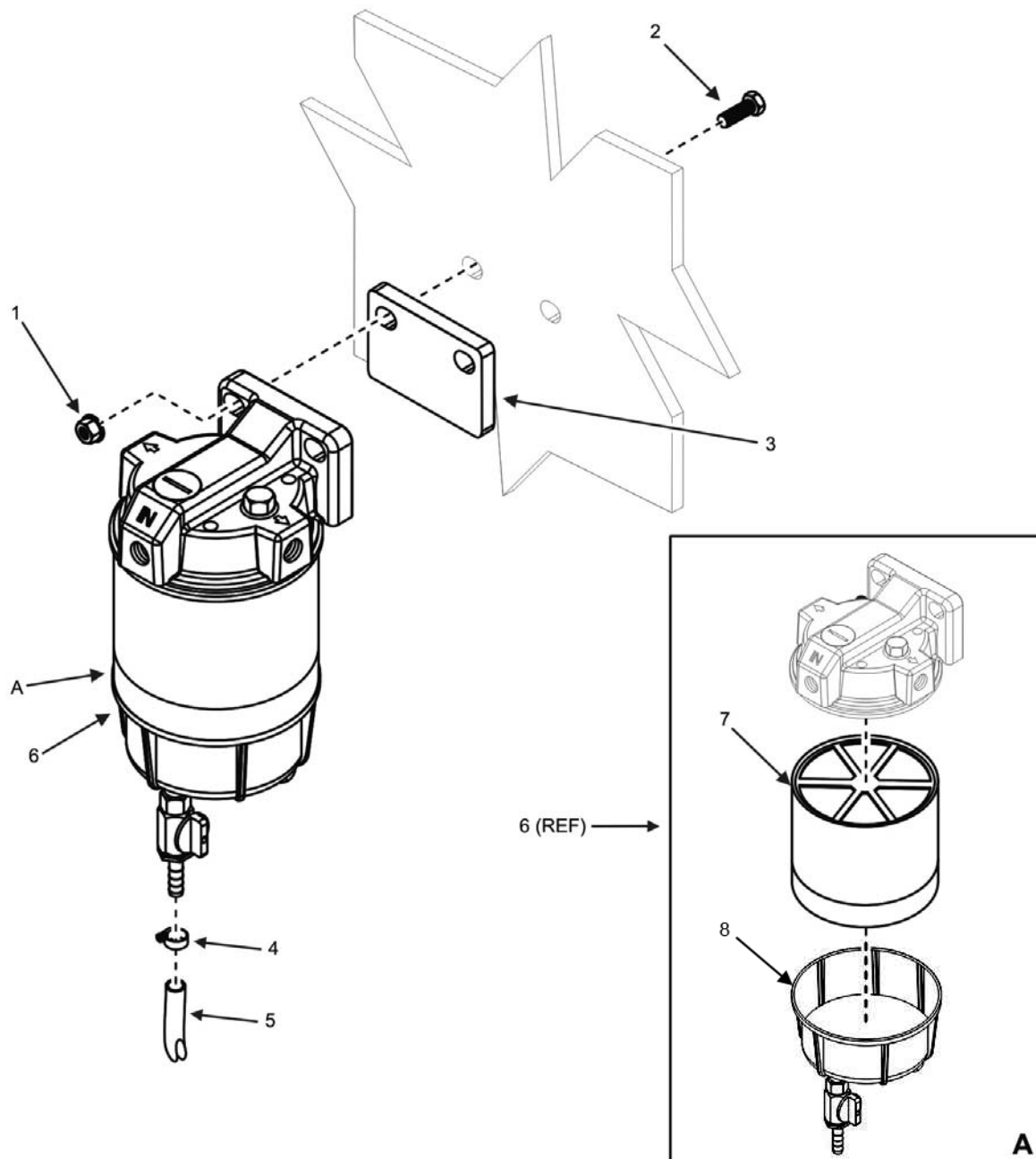


Figure 13. Fuel Filter/Water Separator Assembly (Sheet 1 of 3).

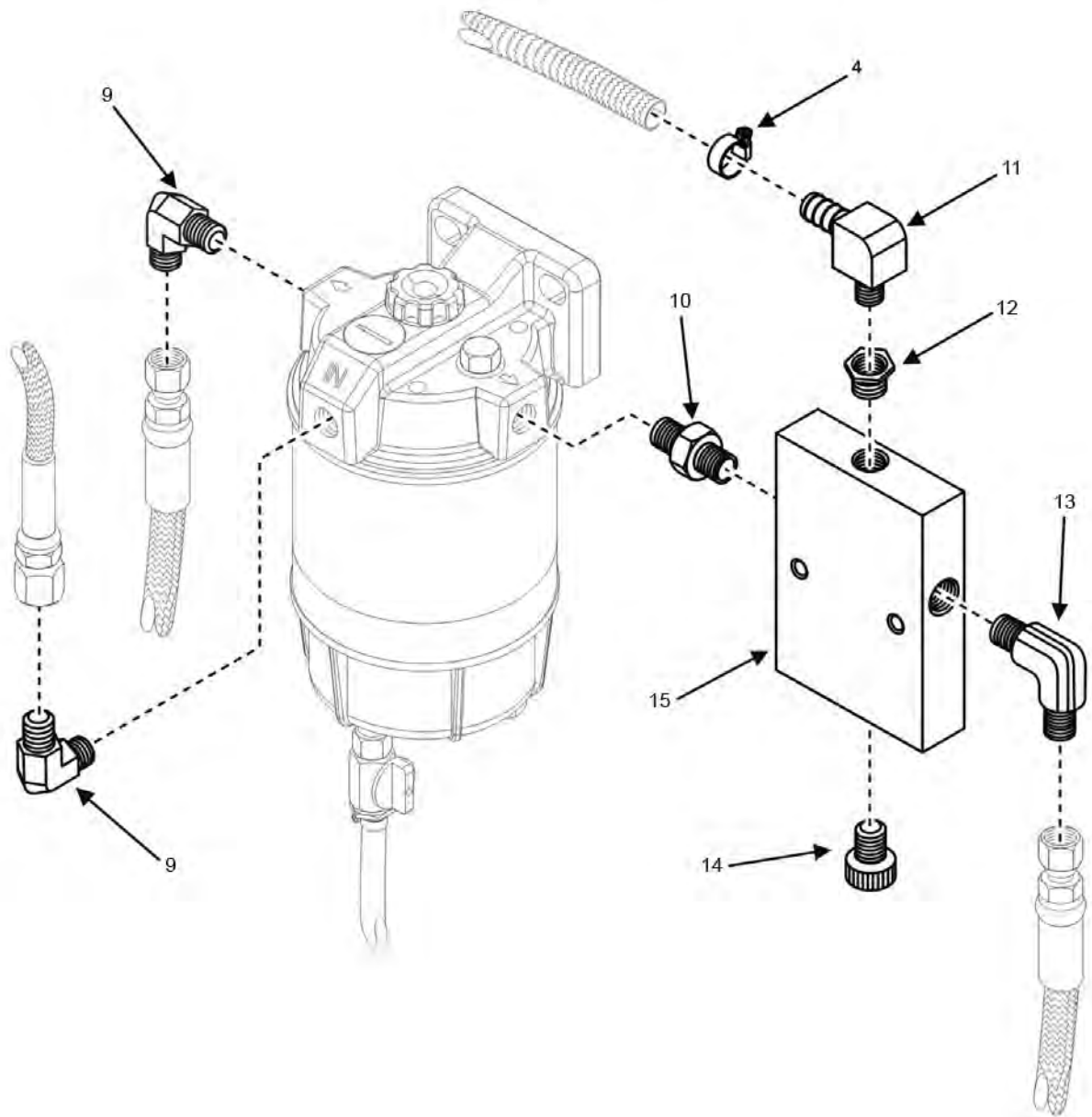


Figure 13. Fuel Filter/Water Separator Assembly (Sheet 2 of 3).

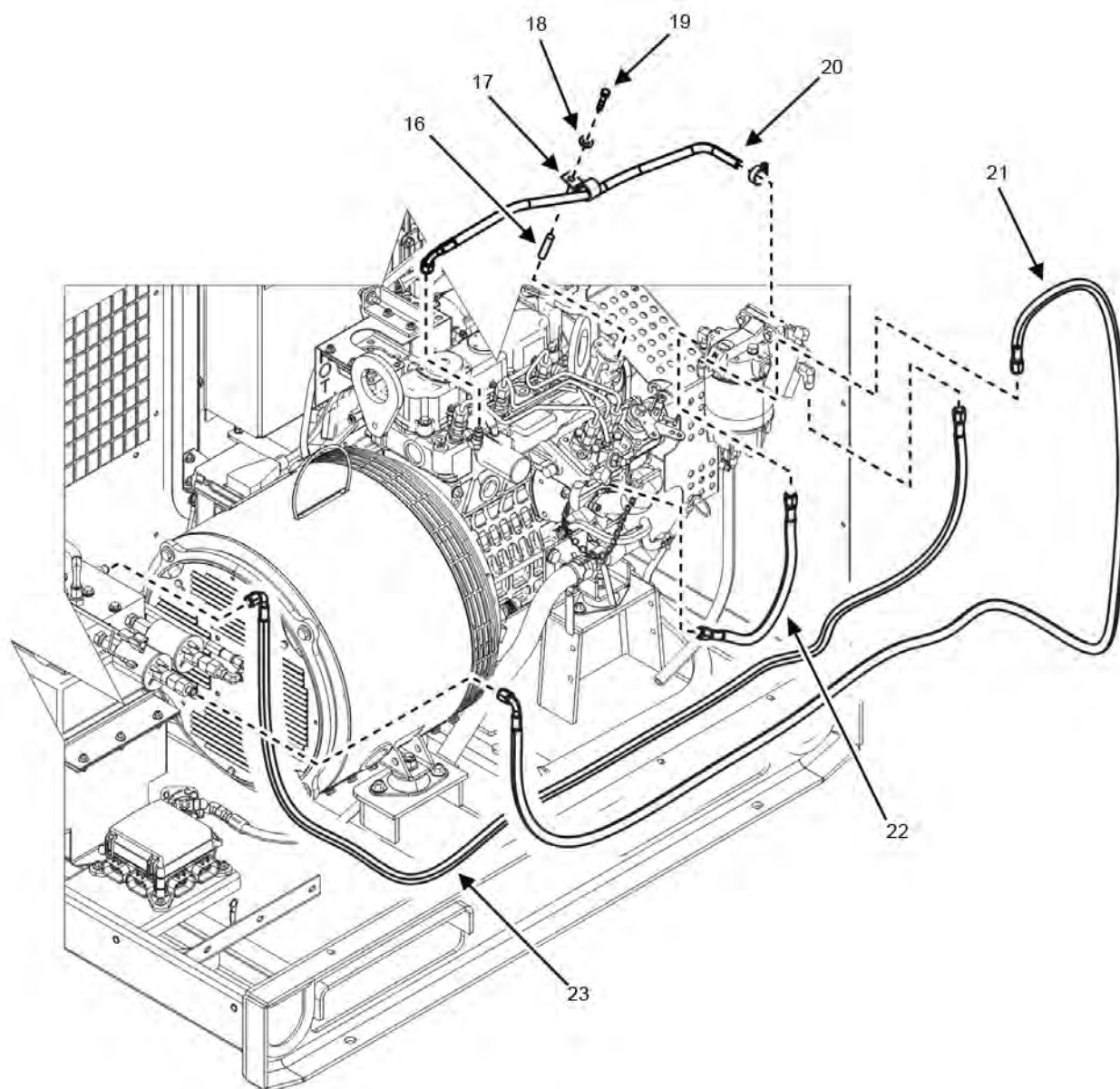


Figure 13. Fuel Filter/Water Separator Assembly (Sheet 3 of 3).

(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 0702 FUEL FILTER/WATER SEPARATOR ASSEMBLY									
FIGURE 13 FUEL FILTER/WATER SEP-ARATOR ASSEMBLY									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-286-6304	S3151	93-193	. NUT, HEX M10X1.5	2
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-592-8054	05047	AES10M10C 030WB4K42	. SCREW, HEX FLANGE HEAD M10X1.5X30	2
3	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21504	. SPACER	1
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-00-871-6729	61424	6202	. CLAMP, HOSE	2
5	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-21485	. HOSE, FUEL, (MAKE FROM 42190109 ON BULK ITEMS LIST CUT TO LENGTH 500±10 MM)	1
6	PAFFF	PAFFF	PAFFF	PAFFF	4930-01-617-7718	55752	215M-ONA N-01	. SEPARATOR, FUEL WATER	1
7	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2910-01-588-0924	55752	R15S	. . FILTER, ELEMENT	1
8	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2910-01-560-5422	55752	RK 30495	. . BOWL, SEDIMENT	1
9	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-593-8323	81343	SAE J514 4- 4 070202C	. ADAPTOR, PIPE	2
10	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-00-278-3722	81343	SAE J514 4- 4 140137C	. NIPPLE, PIPE	1
11	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-595-6012	44940	SAEJ12312- 34314608	. ELBOW, MALE ADAPTER	1
12	PAFZZ	PAFZZ	PAFZZ	PAFZZ			SAEJ51442- 140140B	. REDUCER	1
13	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5975-01-096-3170	30554	SAEJ5145-4 070202C	. FITTING, TUBE ELBOW	1
14	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-601-9476	81343	SAEJ51441 40109C	. PLUG, PIPE	1
15	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20884	. MANIFOLD, FUEL	1
16	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20581	. SPACER	1
17	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-631-0355	75272	CJV-0911	. CLAMP, J	1
18	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-562-6014	62319	DIN-9021-M 6	. WASHER	1
19	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-642-6060	05047	AES07M06B 045WB4AA1	. SCREW	1
20	PCFZZ	PCFZZ	PCFZZ	PCFZZ		30554	04-20767-4	. LINE, FUEL	1

(1)	(2)				(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE				NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
21	PCFZZ	PCFZZ	PCFZZ	PCFZZ	4720-01-597-6246	30554	04-20767-1	. LINE, FUEL	1
22	PCFZZ	PCFZZ	PCFZZ	PCFZZ	4720-01-597-6254	30554	04-20767-12	. LINE, FUEL	1
23	PCFZZ	PCFZZ	PCFZZ	PCFZZ	4720-01-597-6400	30554	04-20767-6	. LINE, FUEL	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 08 OUTPUT BOX REPAIR PARTS LIST

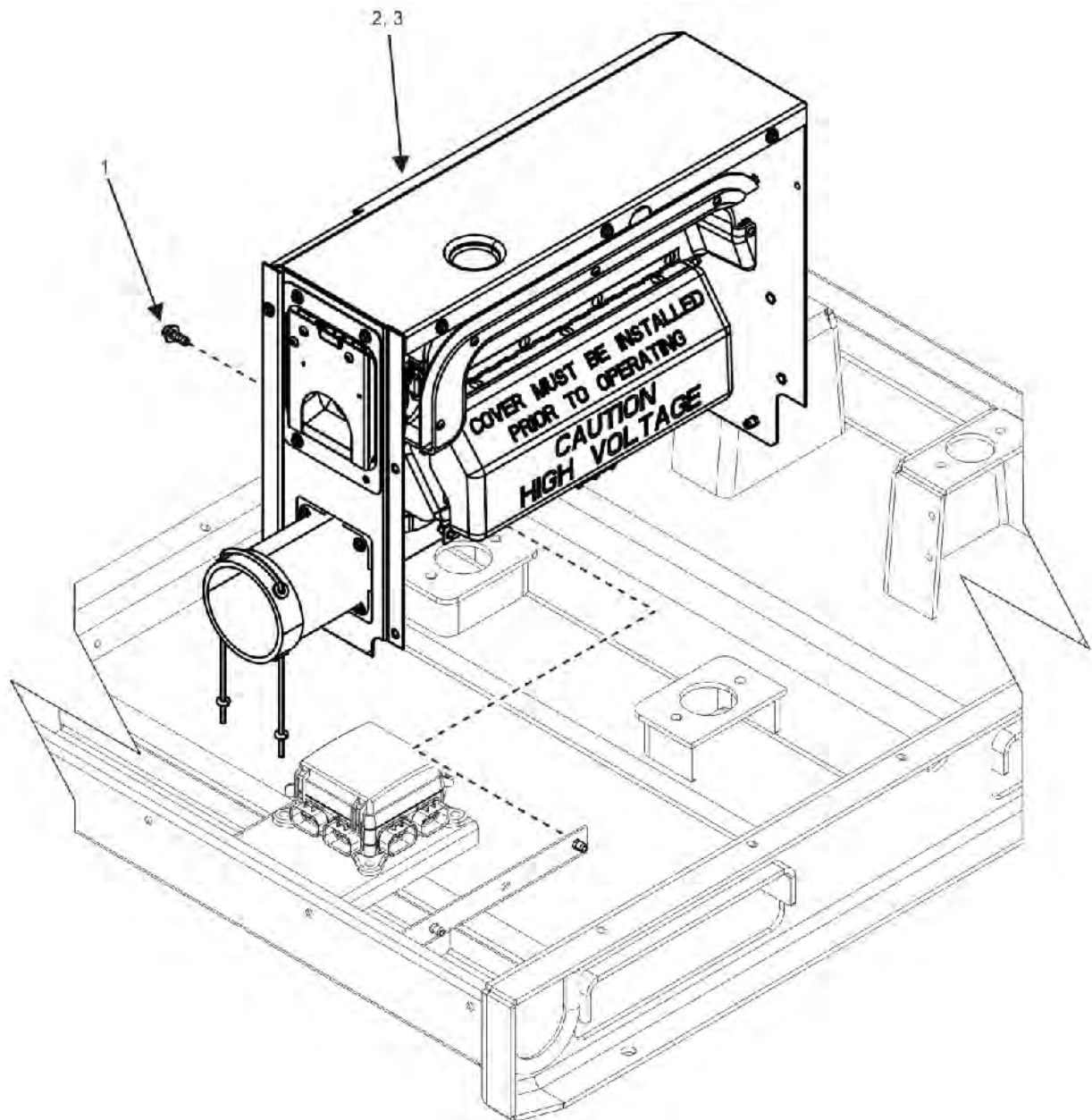


Figure 14. Output Box (Sheet 1 of 2).

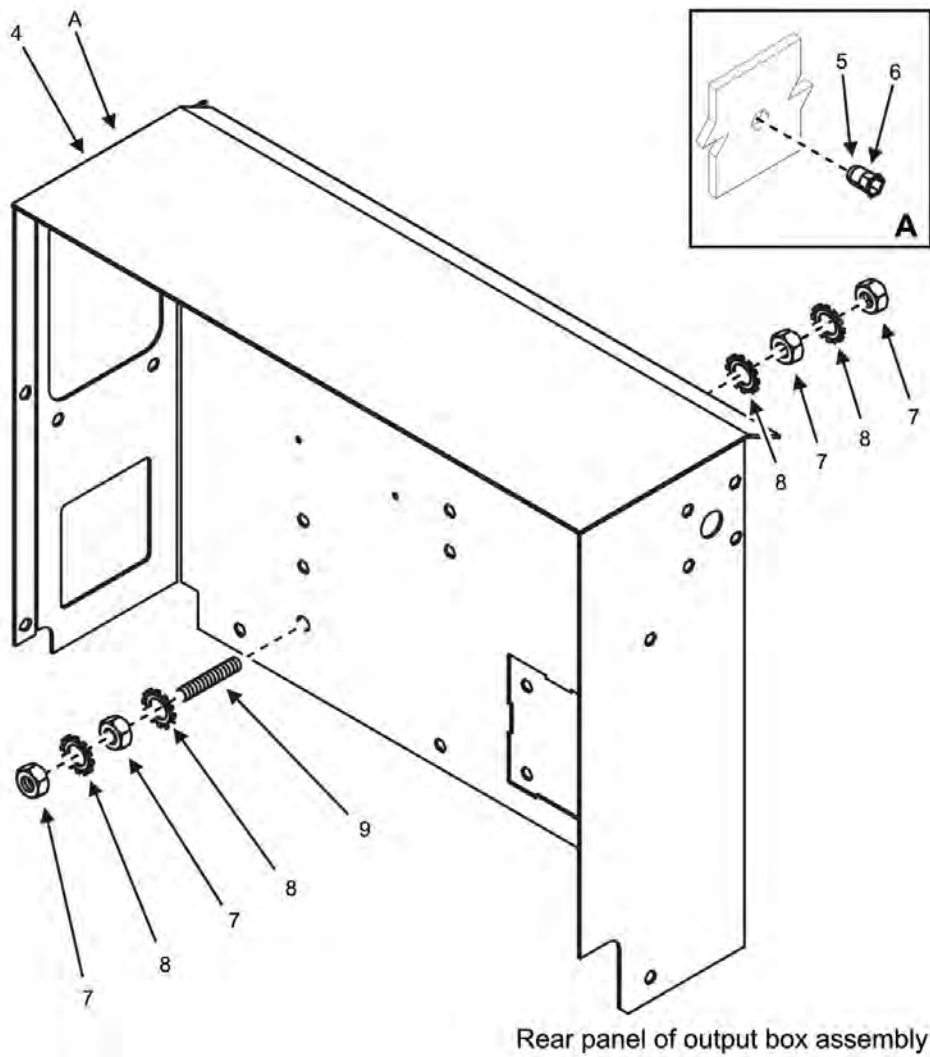


Figure 14. Output Box (Sheet 2 of 2).

(1)	(2)				(3)	(4)	(5)	(6)	(7)
SMR CODE									
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 08 OUTPUT BOX									
FIGURE 14 OUTPUT BOX									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-592-1168	05047	AES10M06A 020WB4K42	. SCREW, HEX FLANGE HEAD M6X1X20	2
2	XBFFF	XBFFF	XBFFF	XBFFF		30554	04-20454-3	. OUTPUT BOX ASSEMBLY UOC: 98E	1
3	XBFFF	XBFFF	XBFFF	XBFFF		30554	04-20454-4	. OUTPUT BOX ASSEMBLY UOC: 98F	1
4	XBFFF	XBFFF	XBFFF	XBFFF		30554	04-20407	. . PANEL, OUTPUT BOX	1
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-589-3727	3A2G6	39101-7603 0	. . . NUT, PLAIN, CLINCH	30
6	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5325-01-589-3734	3A2G6	39101-7503 0	. . . NUT, PLAIN, CLINCH	4
7	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-596-3627	05047	AEN15M10 C000WA2A A1	. . NUT, HEX (M10X1.5)	4
8	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-596-3750	05047	AEW20X010 000BD8A21	. . WASHER, LOCK M10 EXTERNAL STAR	4
9	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5307-01-588-4044	30554	04-21292	. . STUD, PLAIN (M10X1.5X55)	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 0801 CONTACTOR REPAIR PARTS LIST

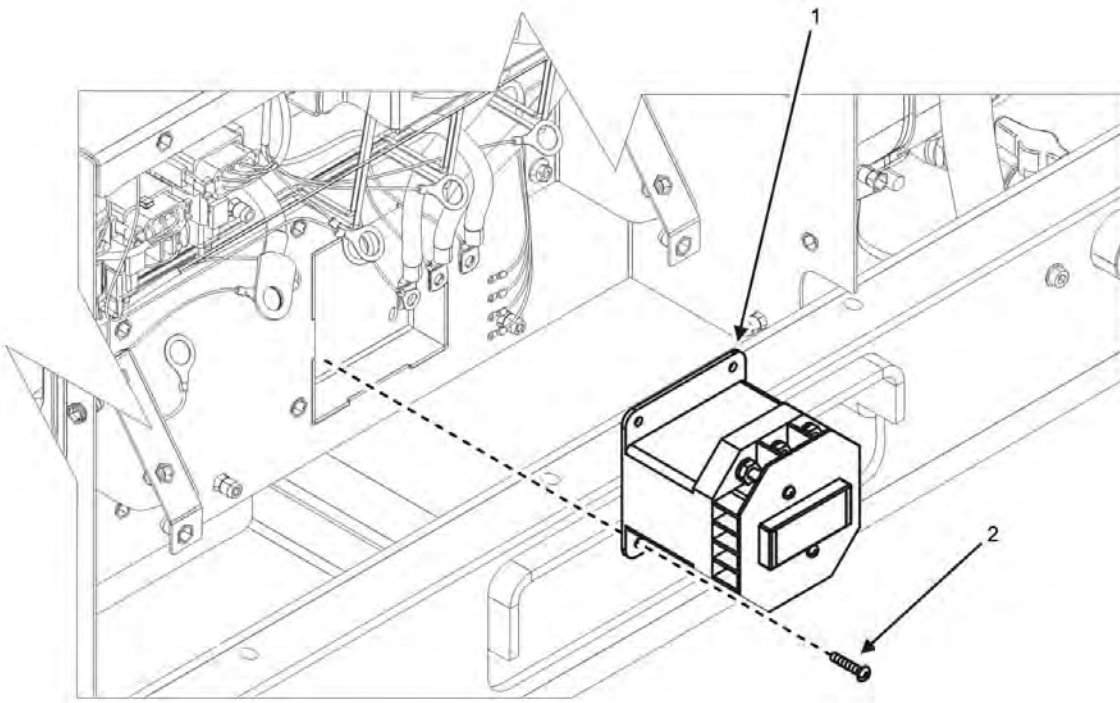


Figure 15. Contactor (Sheet 1 of 3).

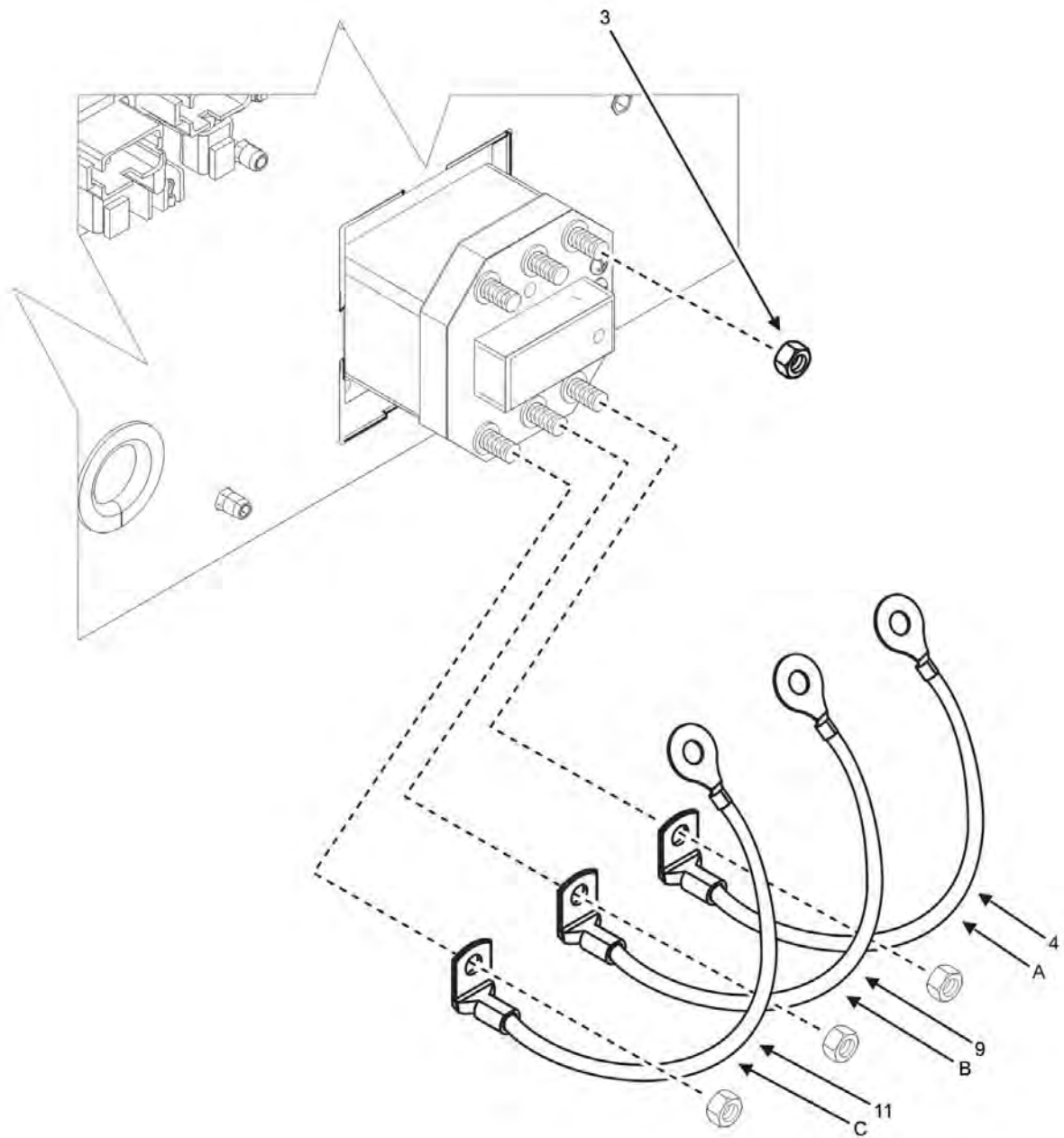


Figure 15. Contactor (Sheet 2 of 3).

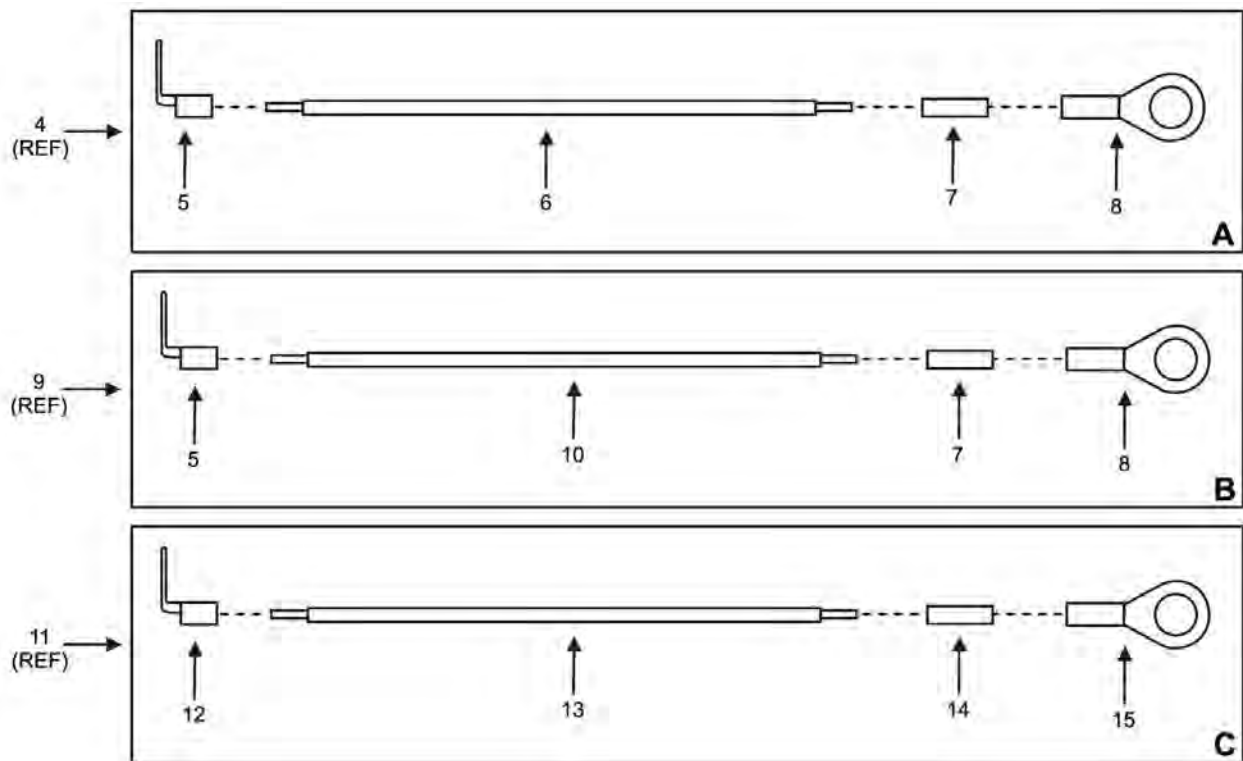


Figure 15. Contactor (Sheet 3 of 3).

(1)	(2)				(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE				NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
GROUP 0801 CONTACTOR FIGURE 15 CONTACTOR									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	6110-01-591-5195	01XD4	CT150E24E 2S	. CONTACTOR, ELECTRICAL	1
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-596-3600	05047	AES46M508 016CH2A31	. SCREW, BUTTON HEAD SOCKET M5X0.8X16	4
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-596-3624	05047	AEN12F250 000CH2A31	. NUT, HEX 1/4-28 UNF STAINLESS	6
4	PAFFF	PAFFF	PAFFF	PAFFF	6150-01-586-0317	30554	04-20261	. LEAD, ELECTRICAL K1-C2 TO TB501-L3	1
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-01-586-0410	00779	35277	. . TERMINAL, LUG	2
6	MFFZZ	MFFZZ	MFFZZ	MFFZZ		0X4C9	04-20567	. . STRAND, WIRE, (MAKE FROM 3271-8-133 ON BULK ITEMS LIST CUT TO LENGTH 210±25 MM)	2
7	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20556	. . LAMINATE, LABEL	2
8	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-00-114-1315	96906	MS20659-12	. . TERMINAL, RING	2
9	PAFFF	PAFFF	PAFFF	PAFFF	6150-01-586-0078	30554	04-20260	. LEAD, ELECTRICAL K1-B2 TO TB501-L2	1
10	MFFZZ	MFFZZ	MFFZZ	MFFZZ	4010-01-593-4805	0X4C9	04-20567	. . STRAND, WIRE, (MAKE FROM 3271-8-133 ON BULK ITEMS LIST CUT TO LENGTH 205±25 MM)	2
11	PAFFF	PAFFF	PAFFF	PAFFF	6150-01-586-1848	30554	04-20696	. LEAD, ELECTRICAL K1-A2 TO TB501-L1	1
12	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-00-143-5573	00779	35678	. . TERMINAL LUG	1
13	MFFZZ	MFFZZ	MFFZZ	MFFZZ		0X4C9	04-20533	. . STRAND, WIRE, (MAKE FROM 327-6-133 ON BULK ITEMS LIST CUT TO LENGTH AS NEEDED)	1
14	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20556	. . . LAMINATE, LABEL	1
15	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-00-504-5877	00779	36808	. . TERMINAL LUG	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 0802 OUTPUT TERMINAL BOARD REPAIR PARTS LIST

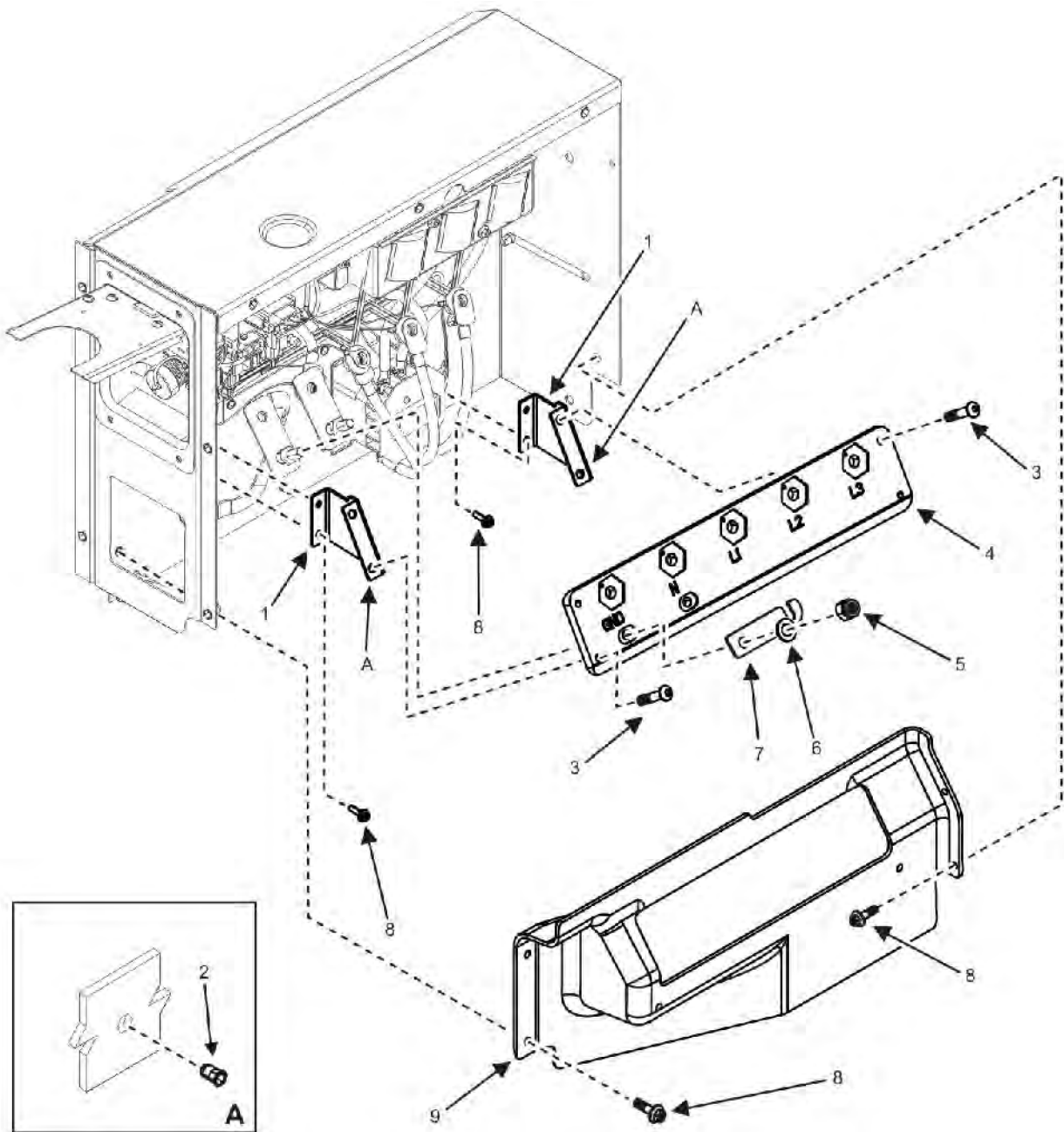


Figure 16. Output Terminal Board (Sheet 1 of 2).

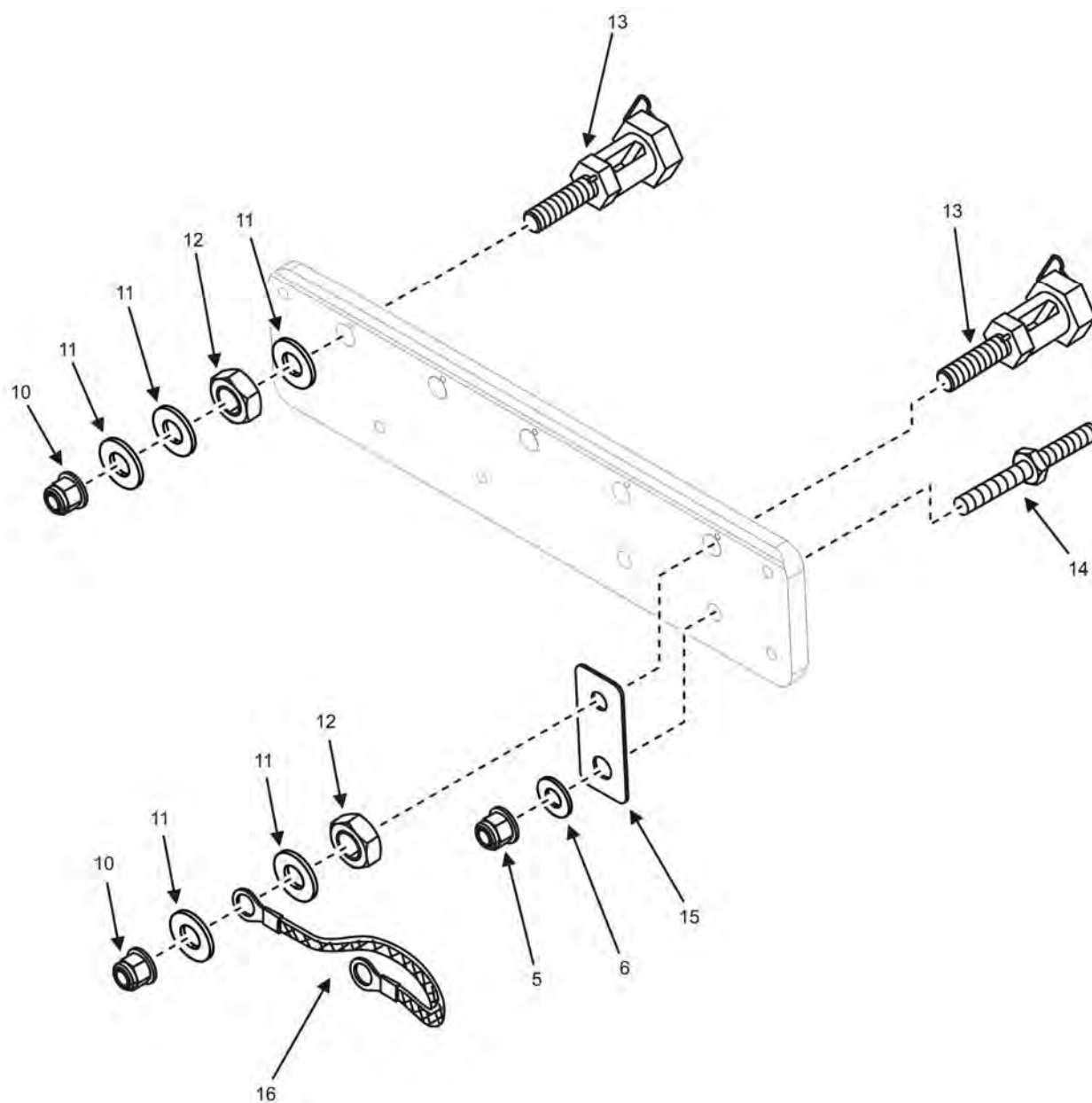


Figure 16. Output Terminal Board (Sheet 2 of 2).

(1)	(2)				(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE				NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
GROUP 0802 OUTPUT TERMINAL BOARD									
FIGURE 16 OUTPUT TERMINAL BOARD									
1	XBFFF	XBFFF	XBFFF	XBFFF		30554	04-20759	. BRACKET, MOUNTING	2
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-589-3727	3A2G6	39101-7603 0	. . NUT, CLINCH	6
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-621-8388	44940	B1834C060 30N	. SCREW, SOCKET HEAD BUTTON M6X1X30	4
4	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20234	. BOARD, CONNECTION	1
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-470-2044	30554	88-20568-3	. NUT, LOCK 3/8 16 UNC28, BRASS	4
6	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-466-4926	81348	FFW92 TYP E A CLE G RI	. WASHER, FLAT	4
7	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20338	. BUSBAR, NEUTRAL	1
8	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-592-1168	05047	AES10M06A 020WB4K42	. SCREW, HEX FLANGE HEAD M6X1X20	8
9	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-587-8553	30554	04-21103	. GUARD, CABLE ENTRY	1
10	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-595-5981	30554	M45913/38C S6N	. NUT, NYLON LOCK 1/213 STAINLESS STEEL	5
11	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-589-4140	3A054	95395A250	. WASHER, FLAT, 1/2 IN, BRASS	13
12	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-00-189-8467	30554	88-22336-1	. NUT, HEX JAM 1/2 13 UNC	5
13	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-00-958-1214	82168	DG3M6F-S- RPC	. TERMINAL STUD, LOAD	5
14	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-01-003-8579	30554	72-2236	. STUD, TERMINAL	2
15	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20335	. BUSBAR, GROUND	2
16	PAFZZ	PAFZZ	PAFZZ	PAFZZ	6145-01-588-6489	30554	04-21116-7	. STRAP, GROUNDING	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 0803 VOLTAGE SELECTION SWITCH REPAIR PARTS LIST

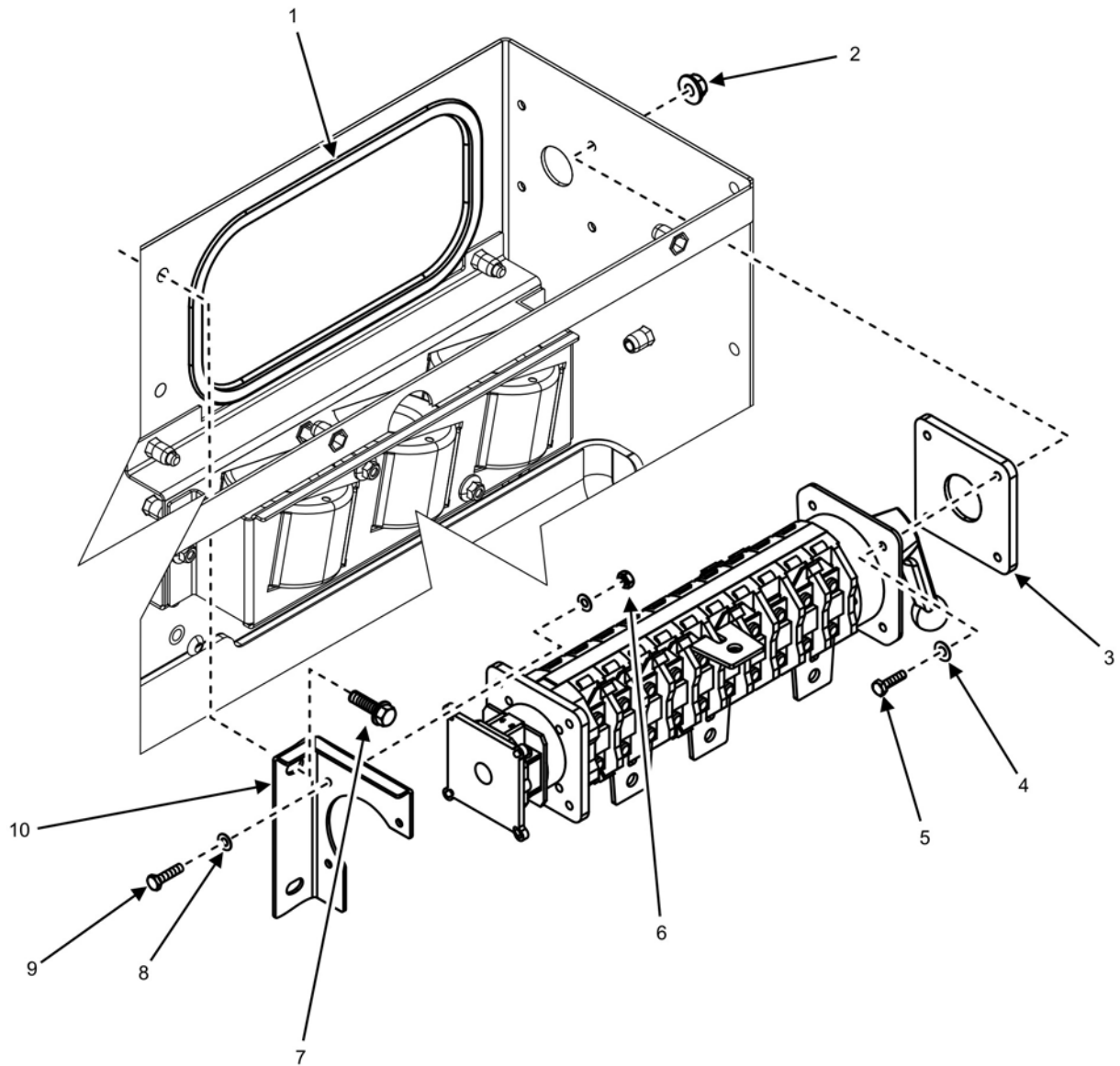


Figure 17. Voltage Selection Switch (Sheet 1 of 6).

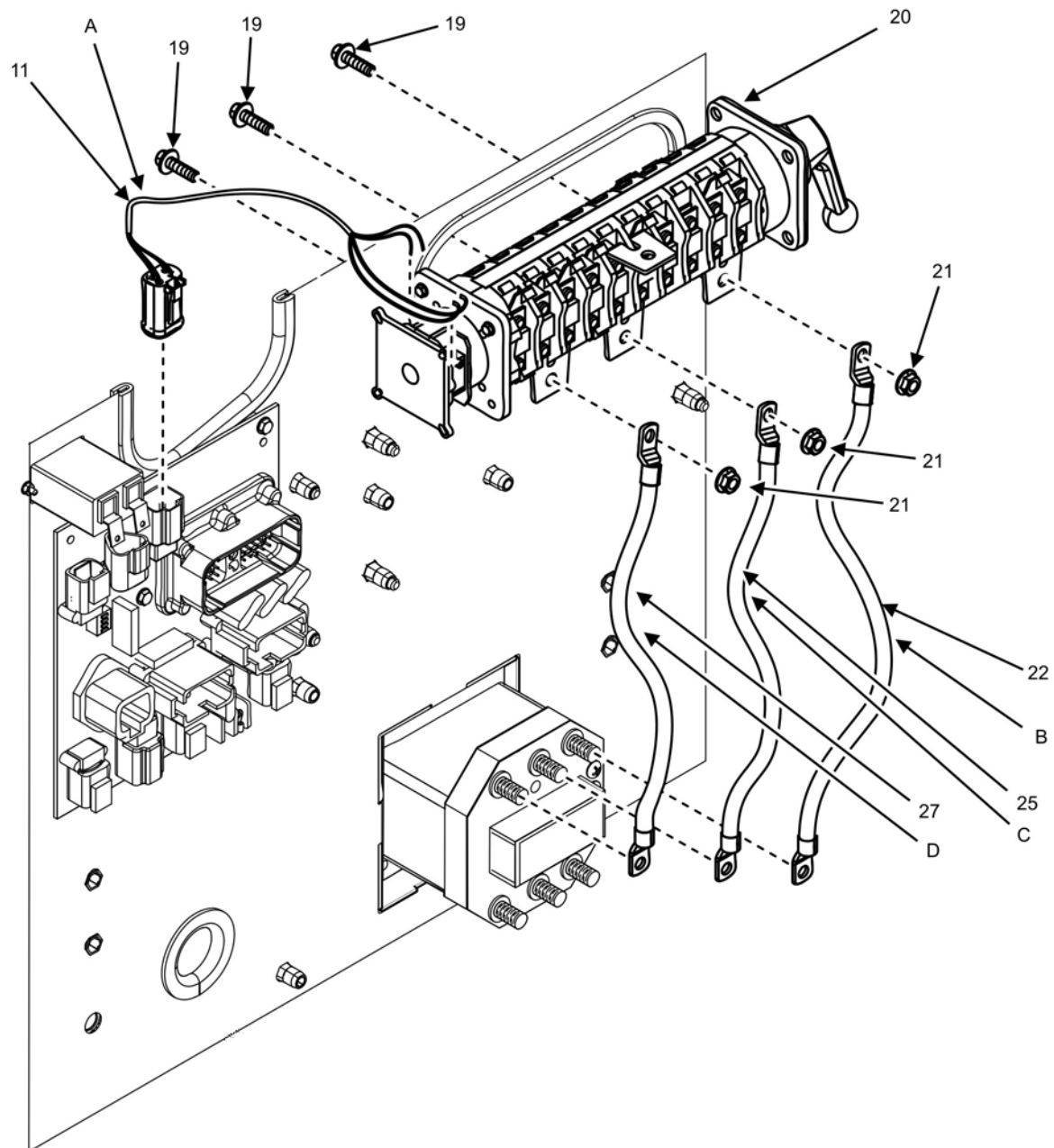


Figure 17. Voltage Selection Switch (Sheet 2 of 6).

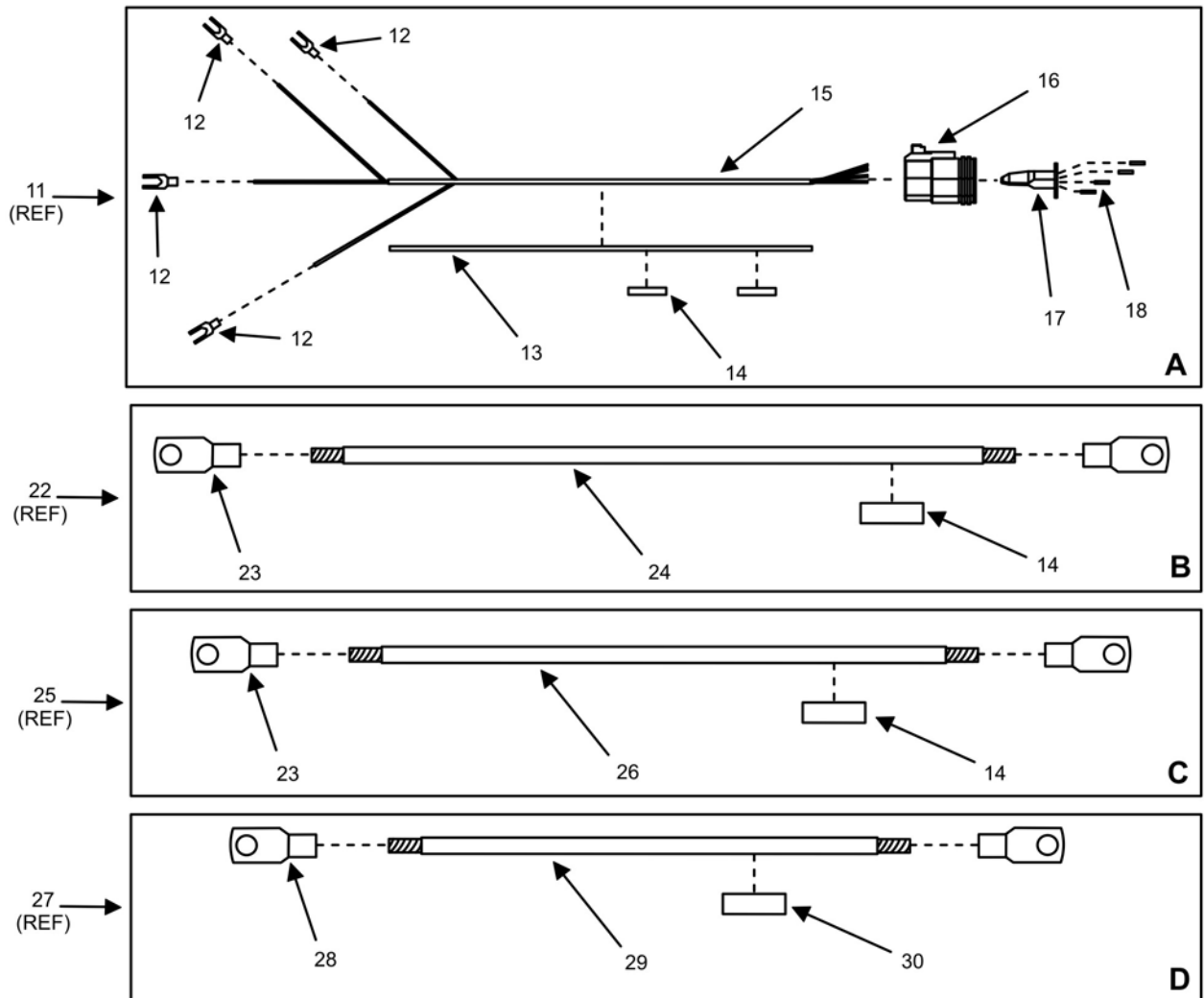


Figure 17. Voltage Selection Switch (Sheet 3 of 6).

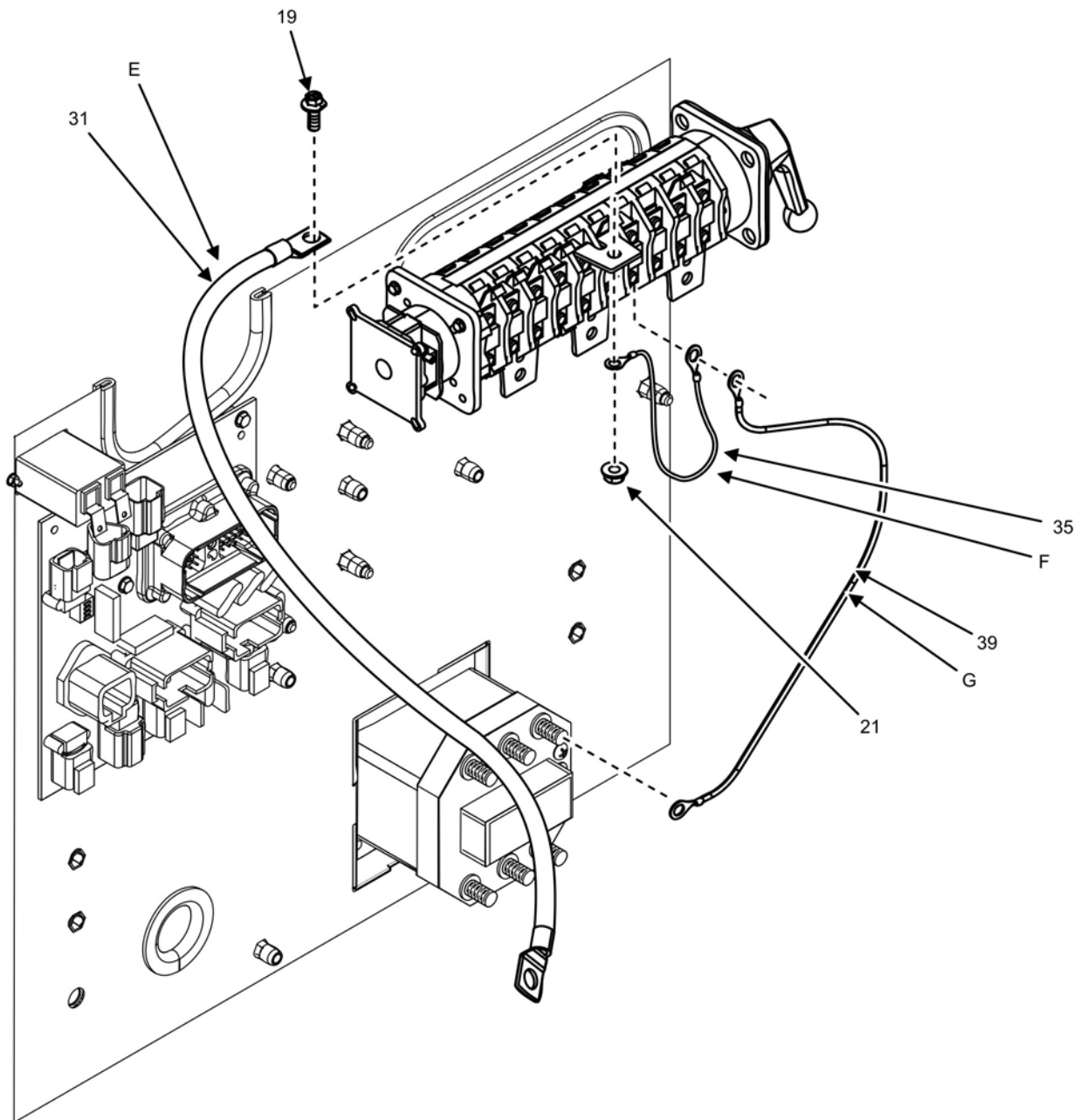


Figure 17. Voltage Selection Switch (Sheet 4 of 6).

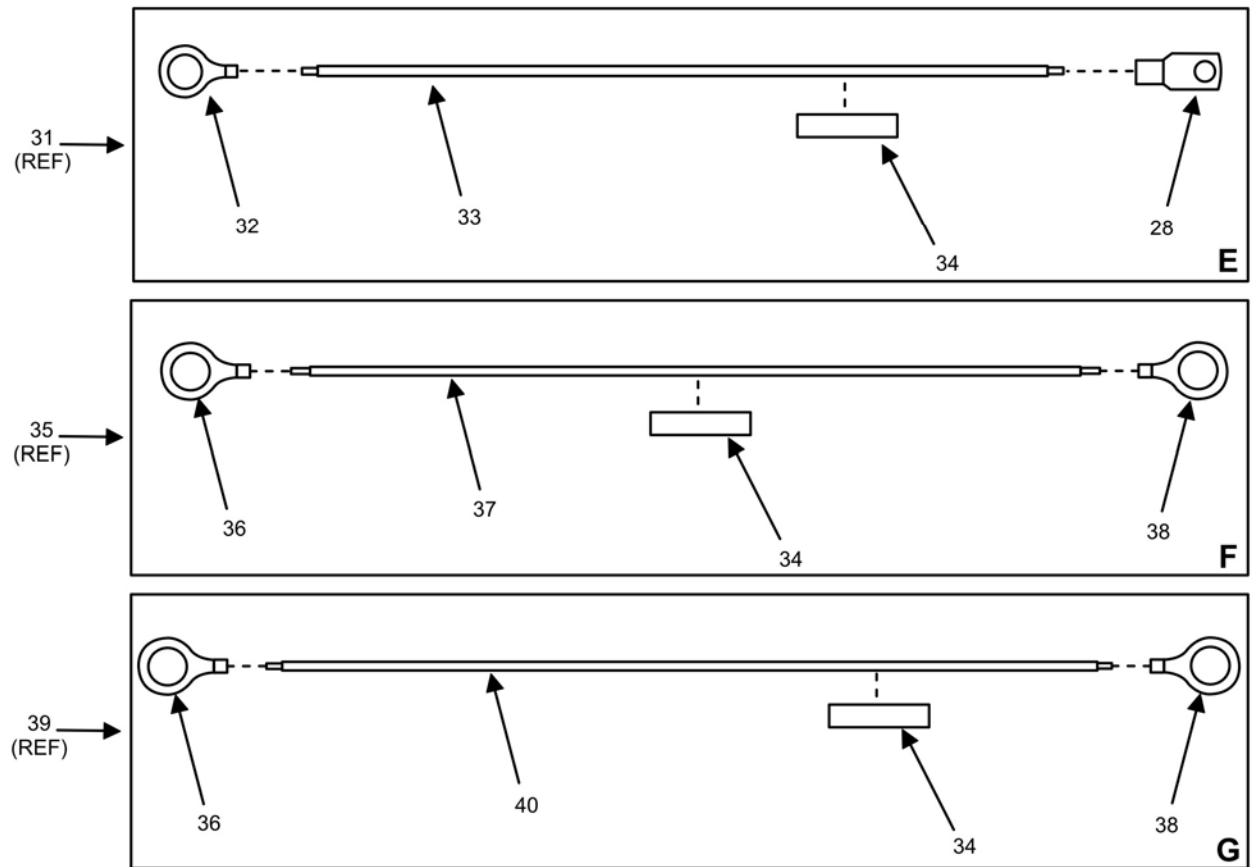


Figure 17. Voltage Selection Switch (Sheet 5 of 6).

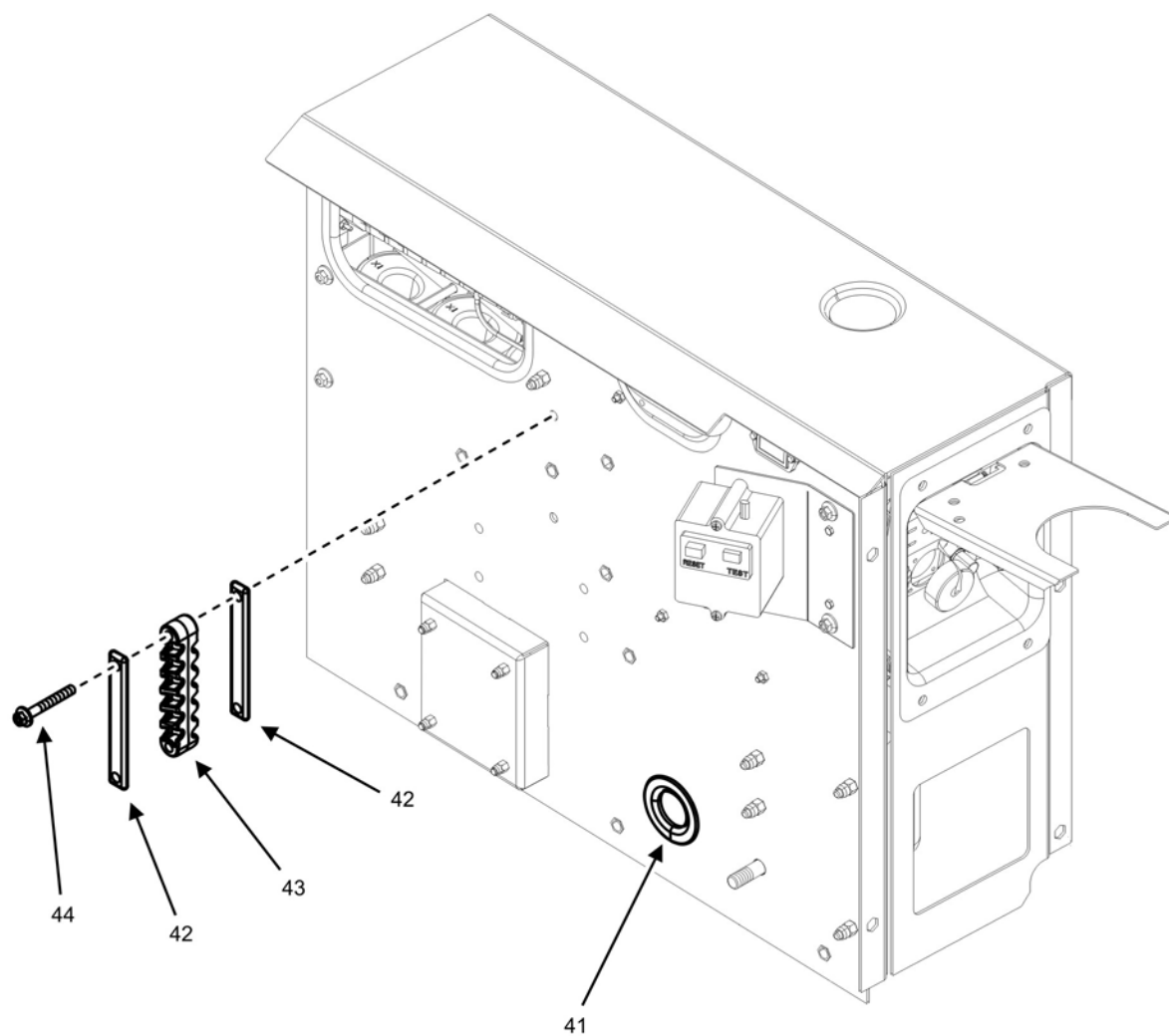


Figure 17. Voltage Selection Switch (Sheet 6 of 6).

(1) ITEM NO.	(2) SMR CODE				(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
								GROUP 0803 VOLTAGE SELECTION SWITCH FIGURE 17 VOLTAGE SELECTION SWITCH	
1	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-20902-1	. EDGING, (MAKE FROM 04-20249 ON BULK ITEMS LIST CUT TO LENGTH 504±5 MM)	1
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-642-3088	D8286	DIN6923-M4	. NUT, HEX FLANGE M4X0.7	4
3	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21152	. PLATE, SWITCH MOUNTING	1
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-484-9183	1KWT0	085295	. WASHER, FLAT M4	4
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-12-141-9806	D8286	DIN933-M4X 6-8.8-A2P	. SCREW, HEX HEAD	4
6	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-588-0392	15526	DIN934-M3	. NUT, HEX M3X0.5	3
7	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-592-1168	44940	AES10M06 A020 WB4K 42	. SCREW, HEX FLANGE HEAD M6X1X20	2
8	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-99-371-1050	KE489	DIN 125 M3	. WASHER, FLAT M3	6
9	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-604-4502	44940	DIN933-M3 X16	. SCREW, HEX HEAD M3X0.5X16	3
10	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20363	. BRACKET, MOUNTING	1
11	PAFFF	PAFFF	PAFFF	PAFFF	6150-01-586-0640	30554	04-20256	. WIRING HARNESS	1
12	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-01-586-0671	44940	04-20720	. . TERMINAL, SPADE M4, 22-16 AWG ..	4
13	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-20447	. . INSULATION SLEEVING, (MAKE FROM EY-1877 ON BULK ITEMS LIST CUT TO LENGTH AS NEEDED)	1
14	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20556	. . LAMINANT, LABEL	4
15	MFFZZ	MFFZZ	MFFZZ	MFFZZ		0X4C9	04-20901	. . STRAND, WIRE, (MAKE FROM 3271-20-10 ON BULK ITEMS LIST CUT TO LENGTH 334±25 MM)	1
16	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-484-6537	30554	04-20472	. . CONNECTOR, PLUG 4 PIN	1
17	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-483-0852	30554	04-20526	. . CONNECTOR, RECEPTACLE	1
18	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5999-01-556-4351	89619	1062-16-06 22	. . CONTACT, ELECTRICAL	4
19	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-596-3670	05047	AES10M06A 016WB4K42	. SCREW, HEX FLANGE HEAD M6X1X16	4
20	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5930-01-586-0041	30554	04-20208	. SWITCH, ROTARY	1

(1) ITEM NO.	(2) SMR CODE				(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
21	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-33-208-2057	D8286	DIN6923-M6	. NUT, HEX FLANGE M6X1	4
22	PAFZZ	PAFZZ	PAFZZ	PAFZZ	6150-01-586-0319	30554	04-20264	. LEAD, ELECTRICAL S501-M3 TO K1-C1	1
23	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-00-655-3318	96906	MS20659-41	. . TERMINAL, RING M6, 8 AWG	4
24	MFFZZ	MFFZZ	MFFZZ	MFFZZ		0X4C9	04-20567	. . WIRE, STRANDED 8 AWG, (MAKE FROM 3271-8-133 ON BULK ITEMS LIST CUT TO LENGTH 273±25 MM)	1
25	PAFFF	PAFFF	PAFFF	PAFFF	6150-01-586-0351	30554	04-20263	. LEAD, ELECTRICAL S501-M2 TO K1-B1	1
26	MFFZZ	MFFZZ	MFFZZ	MFFZZ		0X4C9	04-20567	. . WIRE, STRANDED 8 AWG, (MAKE FROM 3271-8-133 ON BULK ITEMS LIST CUT TO LENGTH 244±25 MM)	1
27	PAFFF	PAFFF	PAFFF	PAFFF	6150-01-586-0087	30554	04-20262	. LEAD, ELECTRICAL S501-M1 TO K1-A1	1
28	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-00-899-0260	96906	MS20659-9	. . TERMINAL, RING M6, 6 AWG	3
29	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-20533	. . WIRE, STRANDED 6 AWG, (MAKE FROM 327-6-133 ON BULK ITEMS LIST CUT TO LENGTH AS NEEDED)	1
30	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20556-8	. . LAMINATE, LABEL	1
31	PAFFF	PAFFF	PAFFF	PAFFF	6150-01-586-1850	30554	04-20266	. LEAD, ELECTRICAL NEUTRAL	1
32	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-00-504-5877	00779	36808	. . TERMINAL, RING M12, 6 AWG	1
33	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-20533	. . STRAND, WIRE, (MAKE FROM 327-6-133 ON BULK ITEMS LIST CUT TO LENGTH AS NEEDED)	1
34	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20556	. . LAMINATE, LABEL	3
35	PAFFF	PAFFF	PAFFF	PAFFF	6150-01-592-6637	30554	04-21614-1	. LEAD, ELECTRICAL JUMPER	1
36	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-01-602-8183	00779	55936-2	. . TERMINAL, RING 1/4 INCH, 22-16 AWG	2
37	MFFZZ	MFFZZ	MFFZZ	MFFZZ		44940	04-20448	. . STRAND, WIRE 16 AWG, (MAKE FROM 3271-16-26 ON BULK ITEMS LIST, CUT TO LENGTH AS NEEDED)	1
38	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-00-617-2896	00779	36160	. . TERMINAL, RING	2
39	PAFFF	PAFFF	PAFFF	PAFFF	6150-01-592-6641	30554	04-21614-2	. LEAD, ELECTRICAL JUMPER	1
40	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-20448	. . STRAND, WIRE 16 AWG, (MAKE FROM P/N 3271-16-26 ON BULK ITEMS LIST, CUT TO LENGTH AS NEEDED)	1
41	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-20902-5	. EDGING, BUSHING, SNAP(MAKE FROM 04-20249 ON BULK ITEMS LIST CUT TO 110±3 MM)	1

(1)	(2)				(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE				NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
42	XBZZ	XBZZ	XBZZ	XBZZ		30554	04-20174	. RETAINER, WIRE	2
43	XBZZ	XBZZ	XBZZ	XBZZ		30554	04-20173	. RETAINER, WIRE	1
44	PAZZ	PAZZ	PAZZ	PAZZ	5305-01-596-3673	05047	AES10M06A 045WB4K42	. SCREW, HEX FLANGE HEAD M6X1X45	2
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 0804 HOUR METER REPAIR PARTS LIST

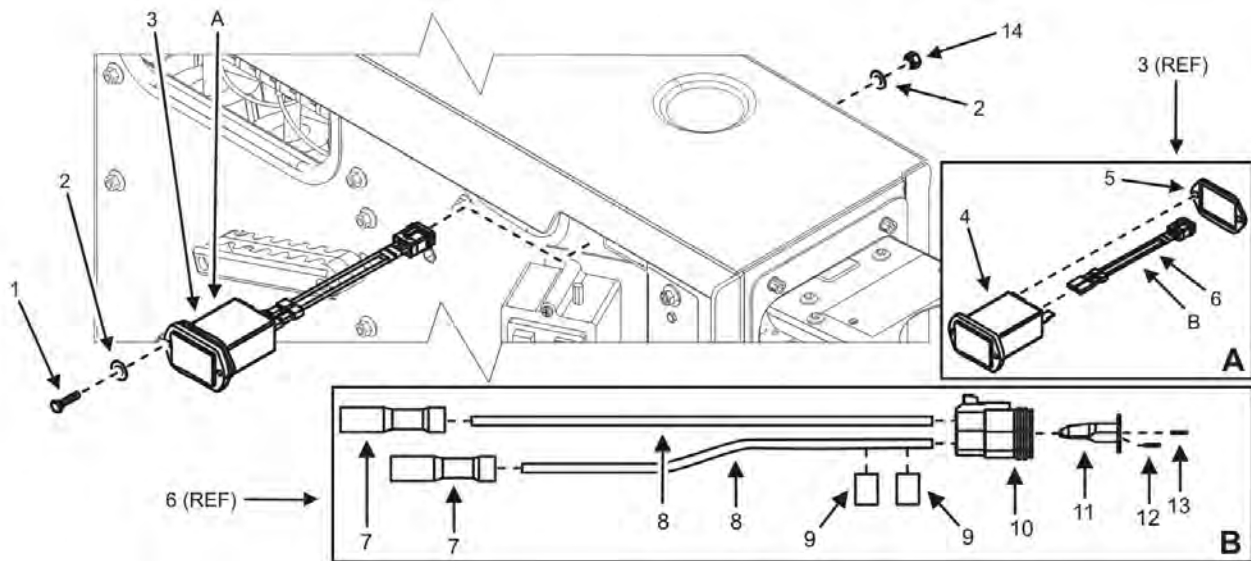


Figure 18. Hour Meter.

(1)	(2)				(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE				NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
GROUP 0804 HOUR METER									
FIGURE 18 HOUR METER									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-604-4502	30554	DIN933-M3 X16	. SCREW, HEX HEAD M3X0.5	2
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-99-371-1050	KE489	DIN 125 M3	. WASHER, FLAT M3	4
3	XBFFF	XBFFF	XBFFF	XBFFF		30554	04-20232	. HOUR METER ASSEMBLY	1
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	6645-01-392-9615	74400	85094-12	. . METER, TIME	1
5	PCFZZ	PCFZZ	PCFZZ	PCFZZ	5330-01-589-4667	74400	81683	. . GASKET	1
6	PAFFF	PAFFF	PAFFF	PAFFF	6150-01-586-0411	30554	04-20453	. . WIRING HARNESS	1
7	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-01-586-0213	30554	88-20275-3	. . . TERMINAL, DISCONNECT	2
8	MFFZZ	MFFZZ	MFFZZ	MFFZZ		44940	04-20448	. . . WIRE, STRANDED 16 AWG, (MAKE FROM P/N 3271-16-26 ON BULK ITEMS LIST, CUT TO LENGTH AS NEEDED))..	1
9	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20556	. . . LAMINATE, LABEL	2
10	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-523-8855	30554	04-20521	. . . CONNECTOR, PLUG 3 PIN	1
11	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-174-1235	30554	04-20703	. . . PLUG, END SEAL, ELECTRICAL SIZE 12, 16	1
12	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5999-01-556-4351	89619	1062-16-06 22	. . . CONTACT, ELECTRICAL, 22-16 AWG	2
13	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-470-8342	11139	W35	. . . POLORIZING KEY, ELECTRICAL	1
14	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-588-0392	15526	DIN934-M3	. NUT, HEX M3X0.5	2
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 0805 CONVENIENCE RECEPTACLE ASSEMBLY REPAIR PARTS LIST

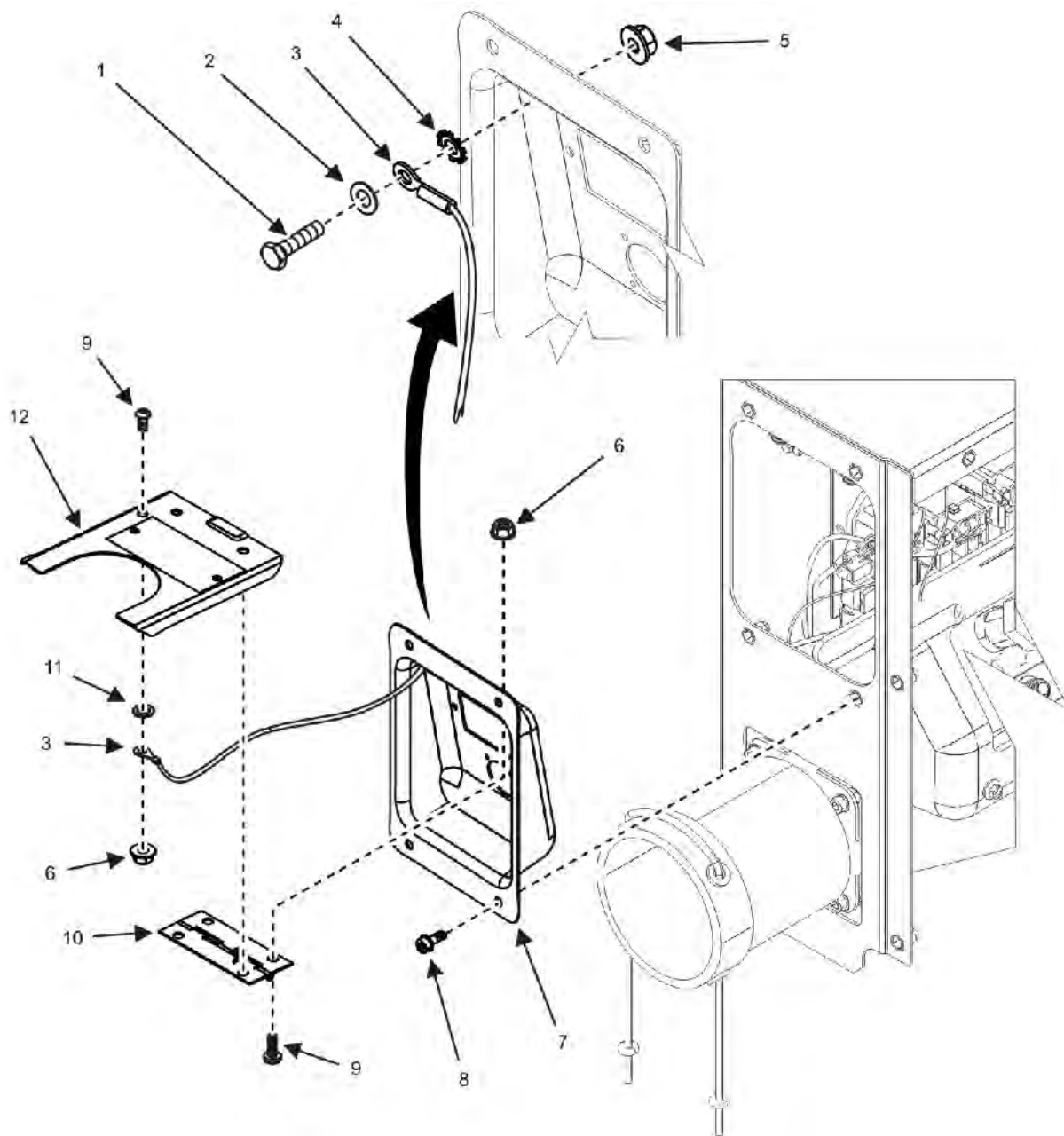


Figure 19. Convenience Receptacle Assembly (Sheet 1 of 5).

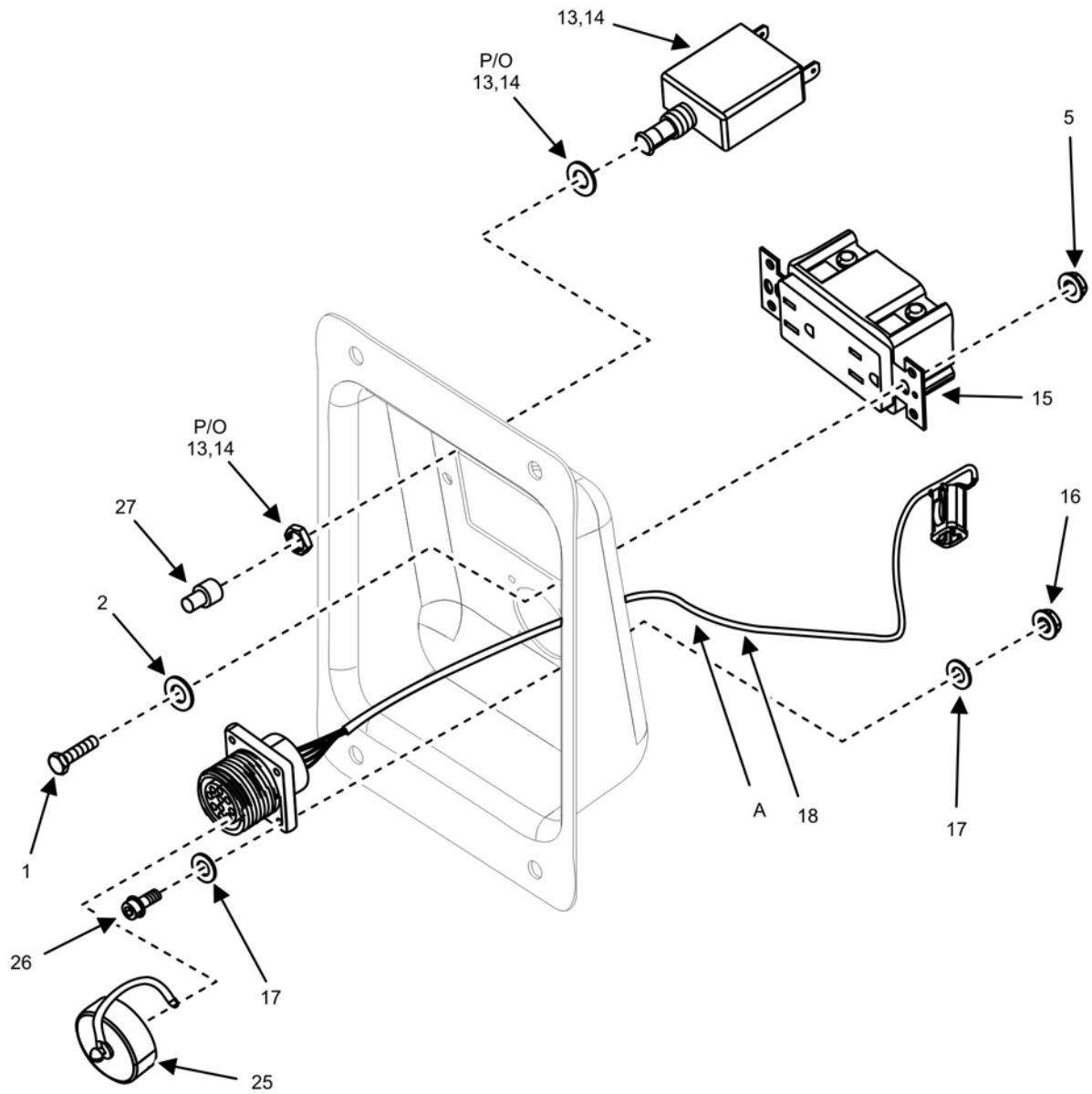


Figure 19. Convenience Receptacle Assembly (Sheet 2 of 5).

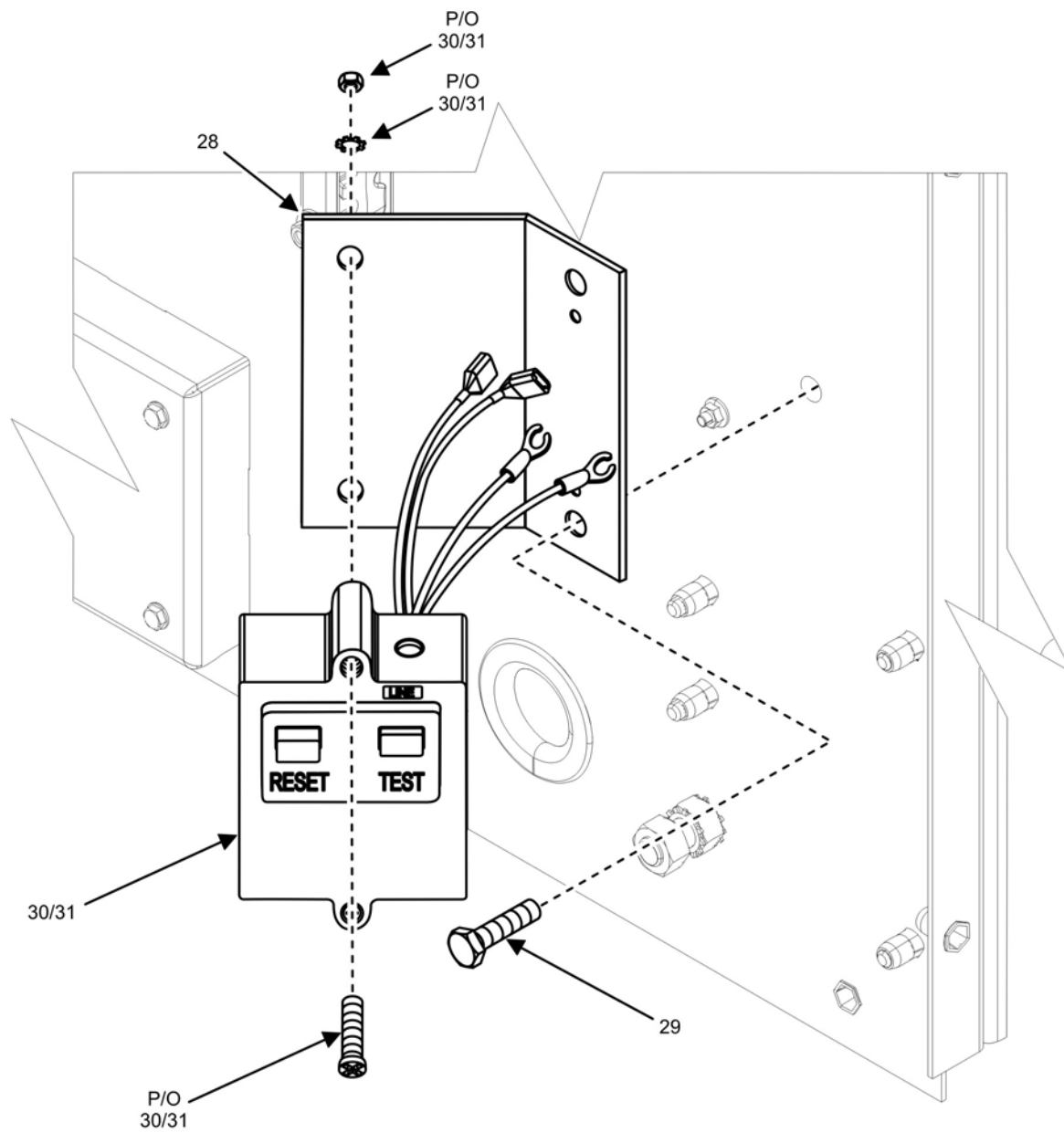


Figure 19. Convenience Receptacle Assembly (Sheet 3 of 5).

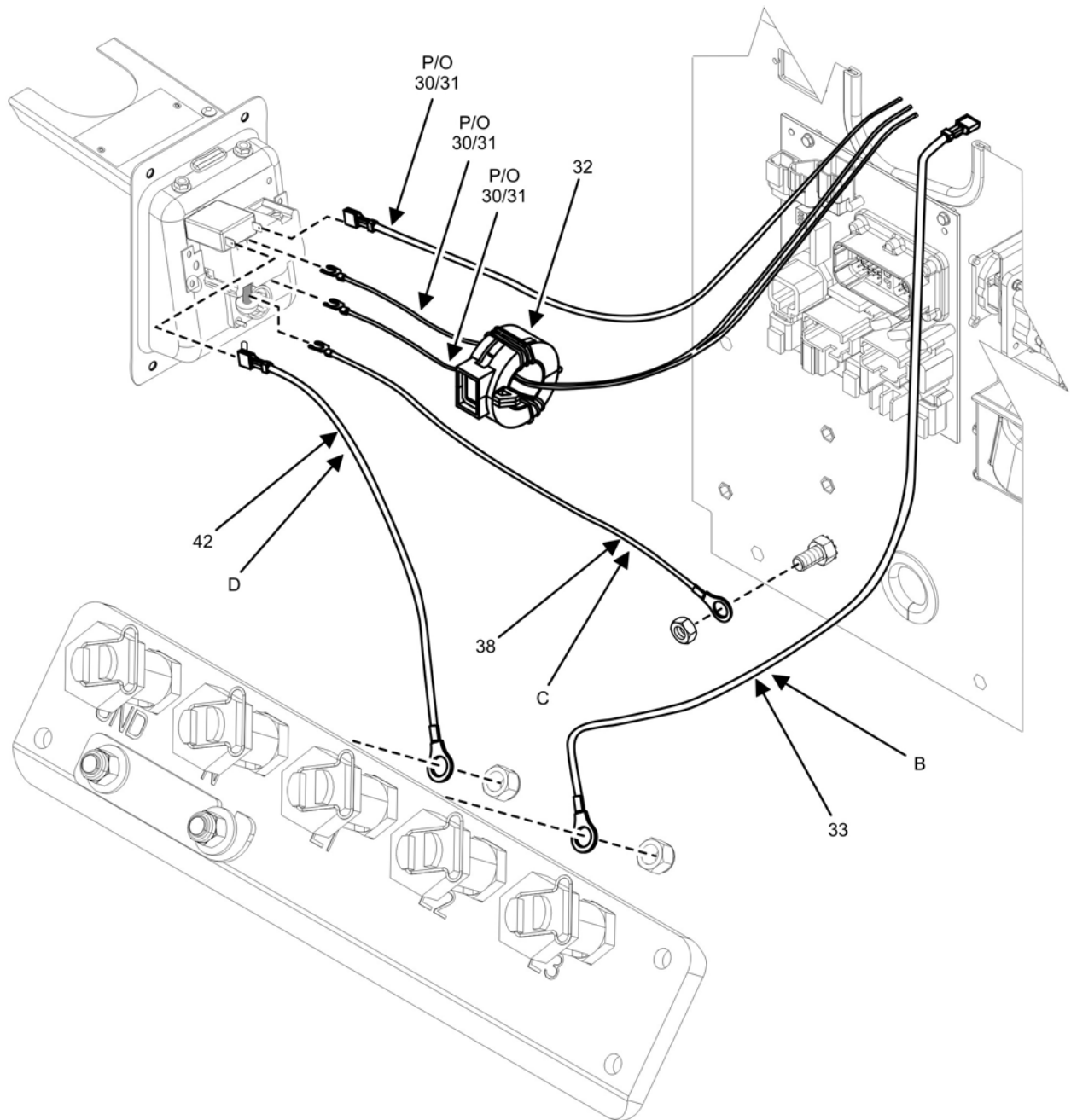


Figure 19. Convenience Receptacle Assembly (Sheet 4 of 5).

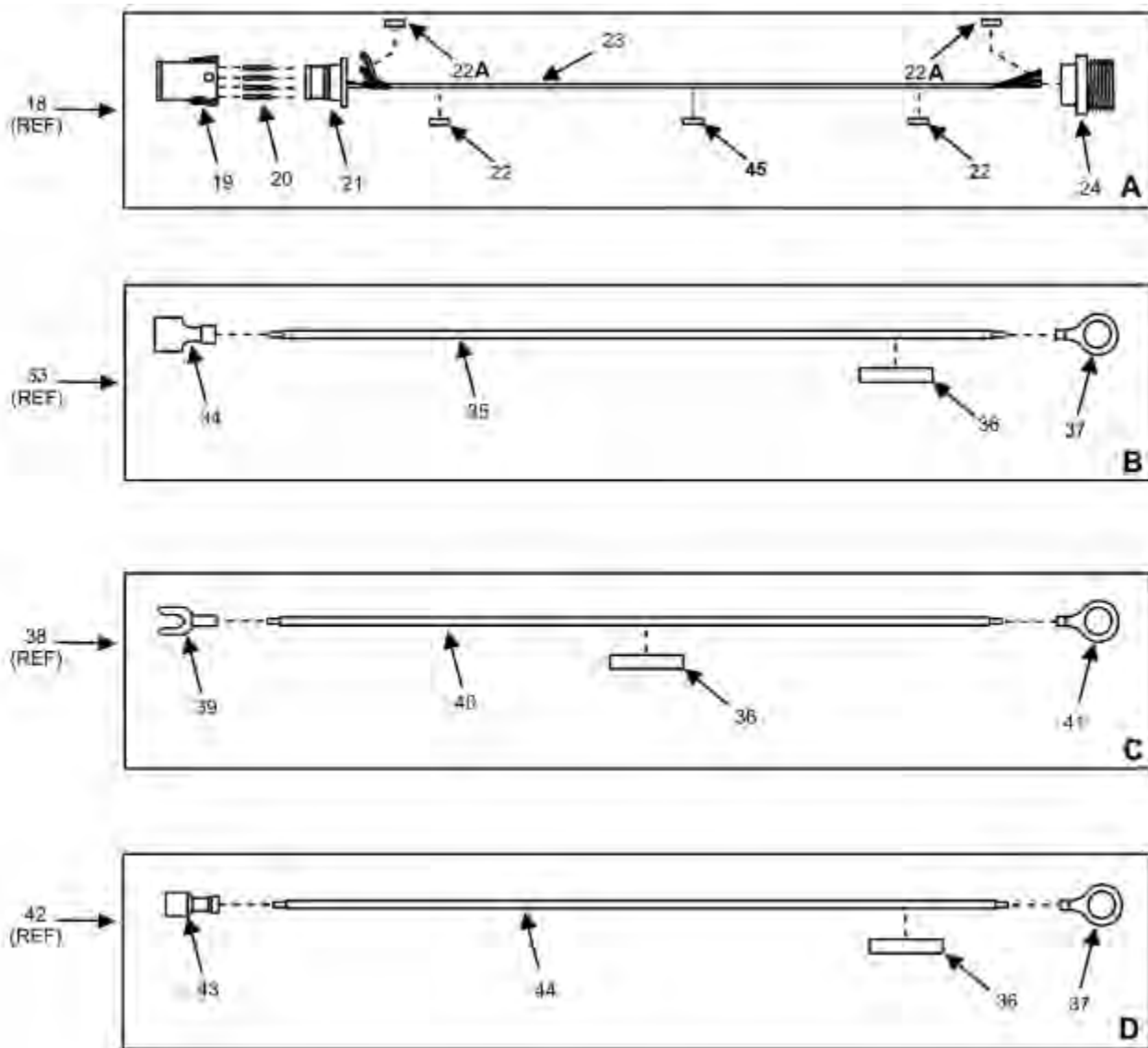


Figure 19. Convenience Receptacle Assembly (Sheet 5 of 5).

(1)	(2)				(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE				NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
GROUP 0805 CONVENIENCE RECEPTACLE ASSEMBLY									
FIGURE 19 CONVENIENCE RECEPTACLE ASSEMBLY									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-12-141-9806	D8286	DIN933-M4X 6-8.8-A2P	. SCREW, HEX HEAD (M4X16)	3
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-484-9183	1KWT0	DIN 125 M4	. WASHER, FLAT M4	3
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5999-01-599-2860	30554	04-21318-1	. STRAP, ELECTRICAL GROUND	1
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-596-3732	05047	AEW13X164 000GD5A21	. WASHER, LOCK #8 EXT TOOTH	1
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ		30554	DIN6923-M4	. NUT, HEX FLANGE (M4X0.7)	3
6	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-33-208-2057	D8286	DIN6923-M6	. NUT, HEX FLANGE (M6X1)	5
7	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20246	. HOUSING, RECEPTACLE GFI BOX	1
8	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-595-7637	4M343	44832	. SCREW, FLANGE HEAD	4
9	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-99-219-7181	I9008	ISO7380-M6 X12-A2-70	. SCREW, SOCKET HEAD BUTTON (M6X1X12)	5
10	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-593-3798	30554	04-20732	. HINGE, DOOR, SPRING LOADED CLOSED	1
11	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-596-3734	05047	AEW13X250 000GD5A21	. WASHER, LOCK 1/4 EXT TOOTH	1
12	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-587-8549	30554	04-20248	. PANEL, DOOR	1
13	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5925-01-586-0232	82647	PR11-62-15 .0A-38808-1 5-V	. BREAKER, CIRCUIT 15A, 50/60HZ UOC: 98E	1
14	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5925-01-595-4319	82647	PR11-42-15. 0A-38809-15	. BREAKER, CIRCUIT 15A, 400HZ UOC: 98F	1
15	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-595-6861	74545	DR20BLKW RTR	. RECEPTACLE, DUPLEX	1
16	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-588-0392	15526	DIN934-M3	. NUT, HEX (M3X0.5)	4
17	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-99-371-1050	30554	DIN125-M3	. WASHER, FLAT M3	8
18	PAFFF	PAFFF	PAFFF	PAFFF	6150-01-633-3780	30554	04-20255	. CABLE ASSEMBLY (P502 TO J522)	1
19	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-484-6537	11139	04-20472	. . CONNECTOR, PLUG (4 PIN)	1
20	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5999-01-642-4392	30554	04-20514	. . CONTACT, SOCKET, (22-16 AWG)	4
21	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-483-0852	30554	04-20526	. . WEDGE, PLUG (4 PIN)	1

(1) ITEM NO.	(2) SMR CODE				(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
22	XBFZZ	XBFZZ	XBFZZ	XBFZZ		53421	TAG26T6-1 00B	. . LAMINATE, LABEL COVER	2
22A	XBFZZ	XBFZZ	XBFZZ	XBFZZ		53421	TAG26T6-1 00B	. . LAMINATE, LABEL COVER	8
23	MFFZZ	MFFZZ	MFFZZ	MFFZZ		16428	04-20768	. . CABLE, POWER, ELECTRICAL, (MAKE FROM 89418 ON BULK ITEMS LIST CUT TO LENGTH 339±25 MM)	1
24	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-590-6702	30554	MS3102R18 -19SN	. . CONNECTOR, PLUG	1
25	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-590-1601	30554	MS25043-1 8DW	. COVER, ELECTRICAL CONNECTOR ..	1
26	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-604-4502	30554	DIN933-M3 X16	. SCREW, HEX HEAD (M3X0.5X16)	4
27	PCFZZ	PCFZZ	PCFZZ	PCFZZ	5930-01-590-0170	30554	04-20331	. BOOT, TERMINAL CIRUIT BREAKER ..	1
28	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21674	. BRACKET, MOUNTING, RELAY	1
29	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-596-3670	05047	AES10M06A 016WB4K42	. SCREW, HEX FLANGE (M6X1X16) UOC: 98F	2
30	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5925-01-602-5165	60177	25960	. INTERRUPTER, GROUND FAULT 400HZ UOC: 98F	1
31	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5920-01-603-2636	30554	04-21818	. INTERRUPTER, GROUND FAULT 50/60HZ UOC: 98E	1
32	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5999-01-619-7656	30554	04-21796	. FILTER, CHOKE, GFI	1
33	PAFFF	PAFFF	PAFFF	PAFFF	6150-01-594-2384	30554	04-21704	. LEAD, ELECTRICAL RECEPTACLE NEUTRAL	1
34	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-01-139-0853	30554	88-20275-4	. . TERMINAL RECEPTACLE	1
35	MFFZZ	MFFZZ	MFFZZ	MFFZZ		44940	04-20448	. . WIRE, STRANDED (16 AWG), (MAKE FROM P/N 3271-16-26 ON BULK ITEMS LIST, CUT TO LENGTH AS NEEDED)	1
36	XBFZZ	XBFZZ	XBFZZ	XBFZZ		53421	TAG26T6-1 00B	. . LAMINATE, LABEL COVER	3
37	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-00-660-3633	81343	MS25036-1 55	. . TERMINAL, RING 1/2 IN RING, 16-14 AWG	2
38	PAFFF	PAFFF	PAFFF	PAFFF	6150-01-586-0601	30554	04-20265	. LEAD, ELECTRICAL, J100 GND TO GND	1
39	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-01-586-1838	44940	04-21167	. . TERMINAL, SPADE M4, 12-10 AWG ..	1
40	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-21158	. . WIRE, STRANDED (12 AWG), (MAKE FROM 3271-12-65 ON BULK ITEMS CUT TO LENGTH 390±25 MM)	1

(1) ITEM NO.	(2) SMR CODE				(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
41	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-01-585-9913	30554	04-21154	. . TERMINAL, RING M10, 12-10 AWG ...	1
42	PAFFF	PAFFF	PAFFF	PAFFF	6150-01-586-1843	30554	04-20712	. LEAD, ELECTRICAL CB501 TO TB501	1
43	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-01-586-0213	30554	88-20275-3	. . TERMINAL, DISCONNECT	1
44	MFFZZ	MFFZZ	MFFZZ	MFFZZ		44940	04-20448	. . WIRE, STRANDED (16 AWG), (MAKE FROM P/N 3271-16-26 ON BULK ITEMS LIST, CUT TO LENGTH AS NEEDED)	1
45	XBFZZ	XBFZZ	XBFZZ	XBFZZ		53421	TAG22T3-1 00B	. . LAMINATE, LABEL COVER	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 0806 TRANSFORMERS REPAIR PARTS LIST

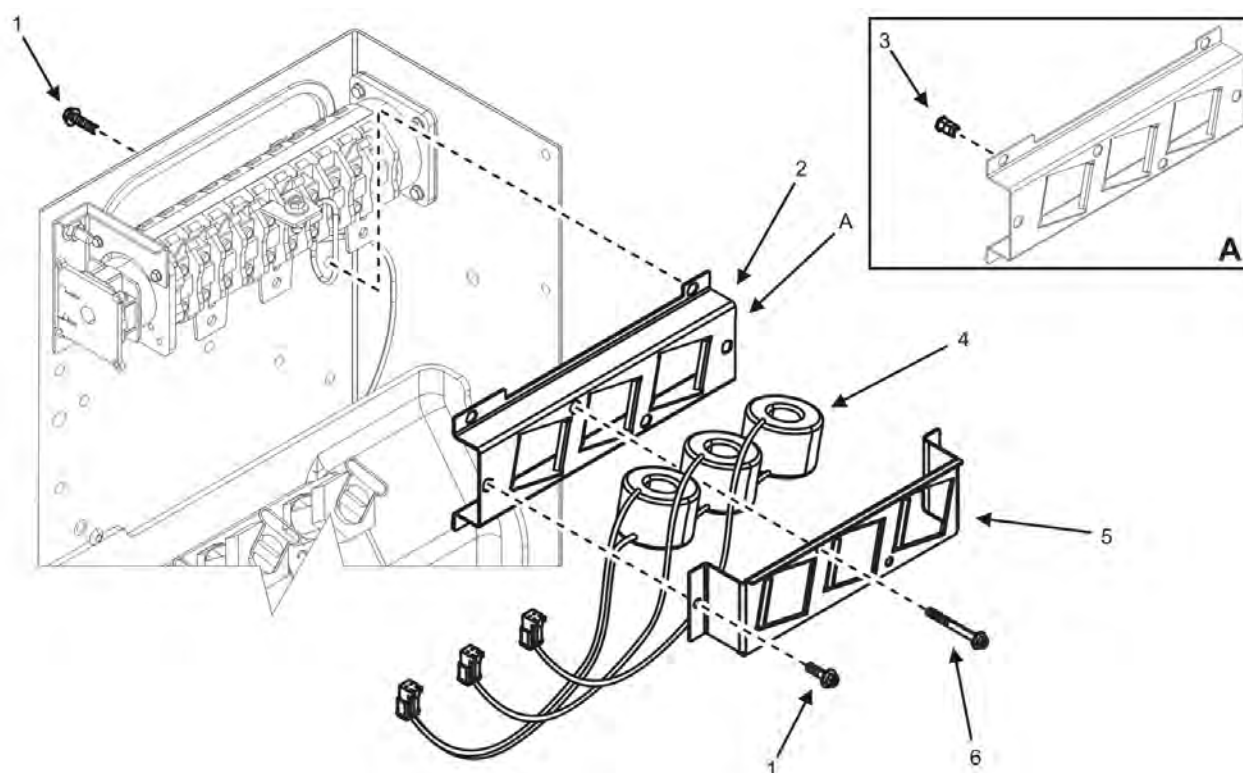


Figure 20. Transformers.

(1)	(2)				(3)	(4)	(5)	(6)	(7)
SMR CODE									
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 0806 TRANSFORMERS									
FIGURE 20 TRANSFORMERS									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-592-1168	30554	AES10M06A . SCREW, HEX FLANGE HEAD 020WB4K42 M6X1X20		6
2	XBFFF	XBFFF	XBFFF	XBFFF		30554	04-20292 . BRACKET, MOUNTING, BOTTOM		1
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-589-3727	30554	04-20193 . . NUT, CLINCH		8
4	PBFZZ	PBFZZ	PBFZZ	PBFZZ	5950-01-590-0439	30554	04-20193 . TRANSFORMER, CURRENT 105 AMP		3
5	XBZFZ	XBZFZ	XBFZZ	XBZFZ		30554	04-20293 . BRACKET, MOUNTING, TOP		1
6	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-596-3678	05047	AES10M06 . SCREW, HEX FLANGE HEAD A0 55WB4K M6X1X55 42		2
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 0807 PRINTED CIRCUIT BOARD MODULE REPAIR PARTS LIST

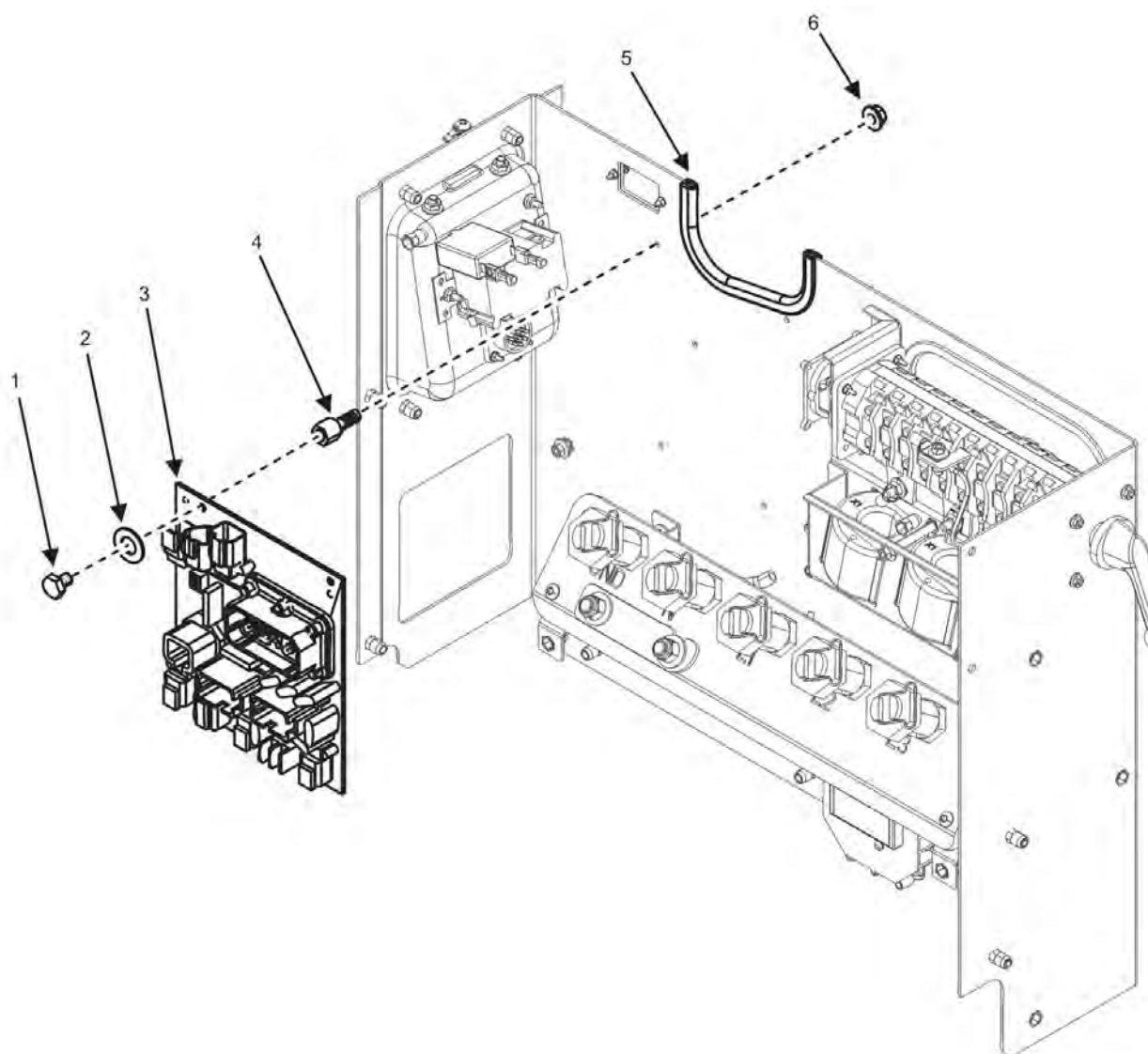


Figure 21. Printed Circuit Board Module (Sheet 1 of 3).

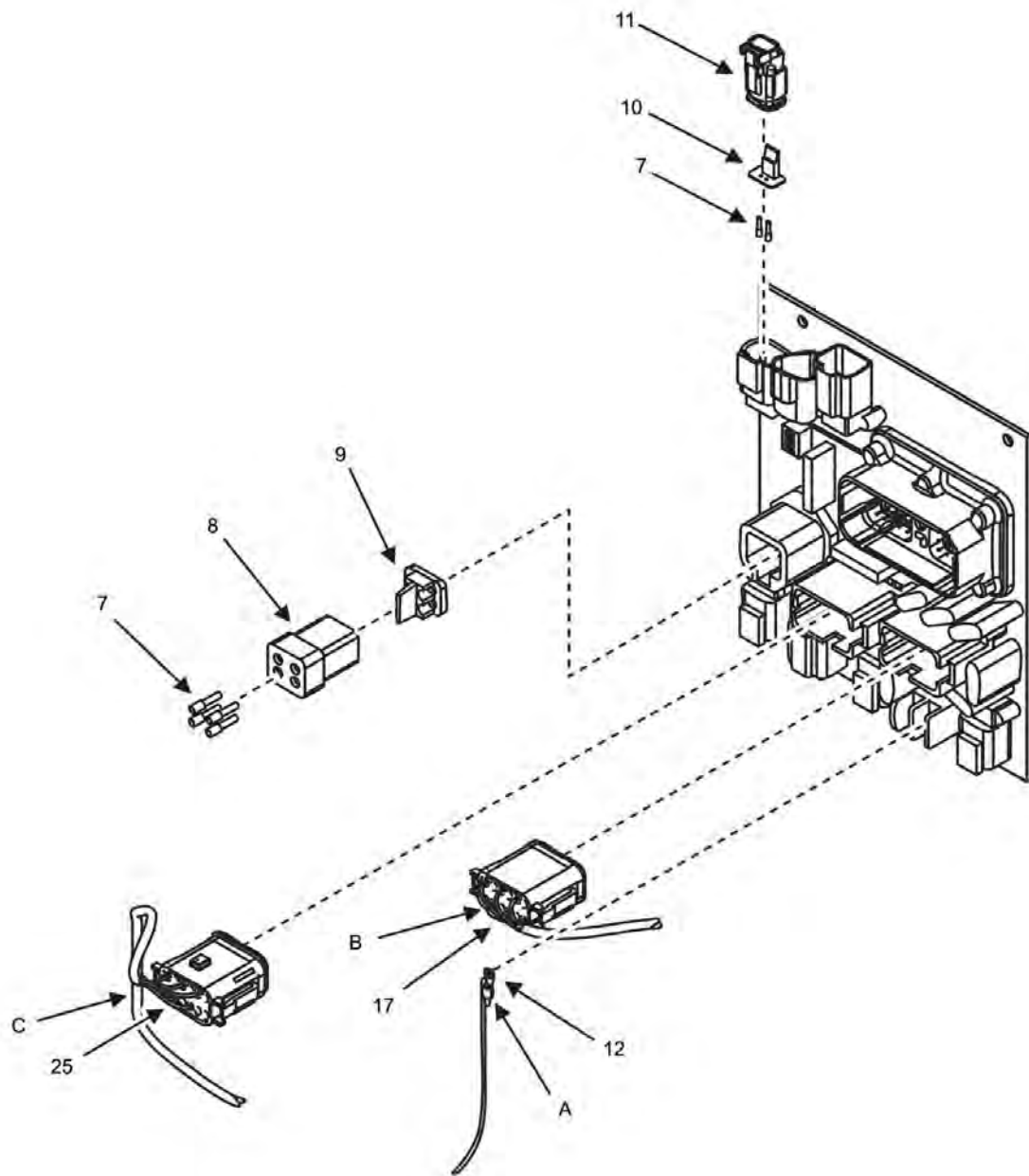


Figure 21. Printed Circuit Board Module (Sheet 2 of 3).

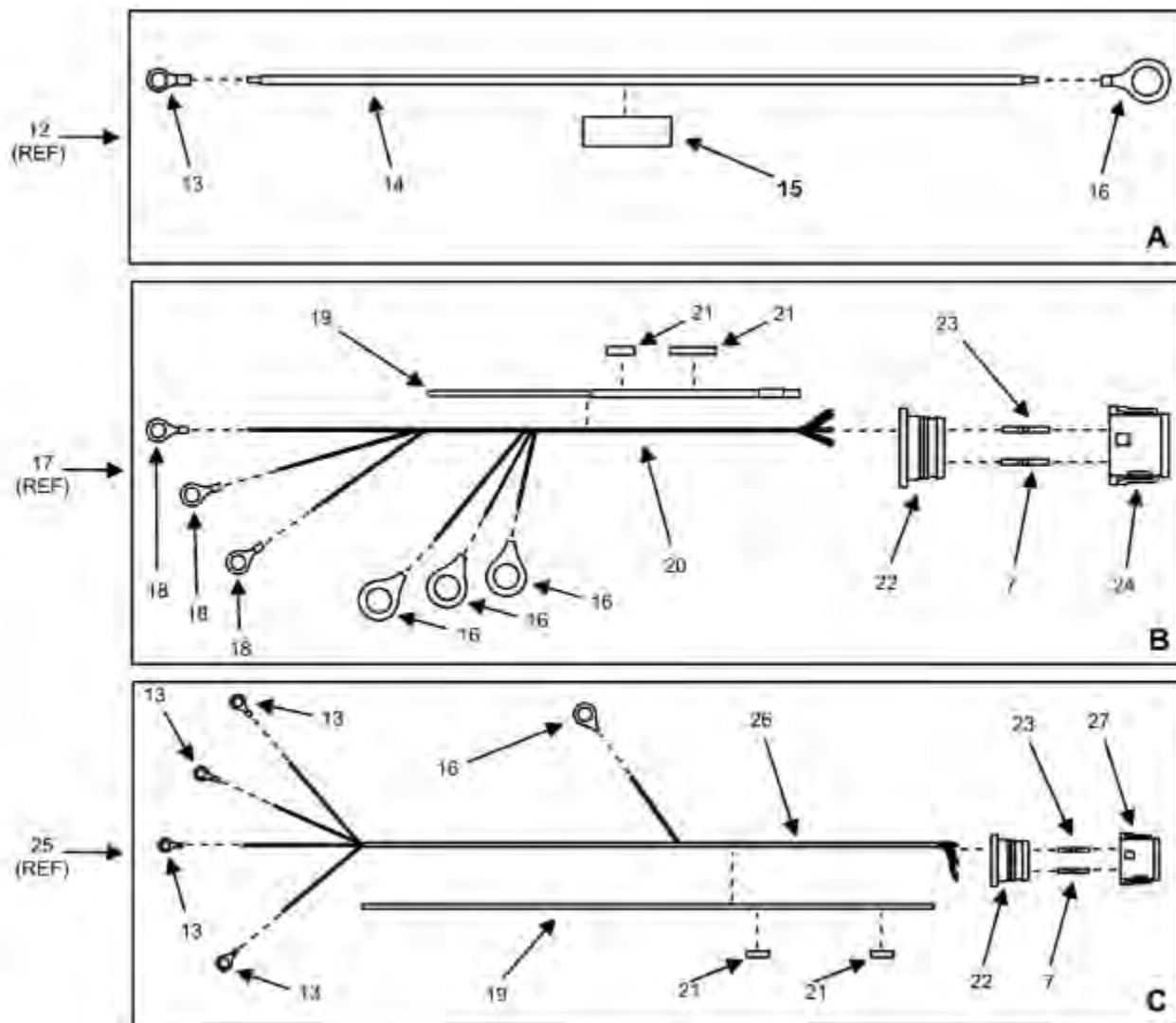


Figure 21. Printed Circuit Board Module (Sheet 3 of 3).

(1) ITEM NO.	(2) SMR CODE				(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
								GROUP 0807 PRINTED CIRCUIT BOARD MODULE	
								FIGURE 21 PRINTED CIRCUIT BOARD MODULE	
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-12-141-9806	D8286	DIN933-M4X 6-8.8-A2P	. SCREW, HEX HEAD	5
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-484-9183	1KWT0	085295	. WASHER, FLAT	5
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5998-01-586-0344	30554	04-20409	. MODULE, PRINTED CIRCUIT BOARD	1
4	XBFZZ	XBFZZ	XBFZZ	XBFZZ	5365-01-590-8328	04729	MMF1203M 06F16M4	. SPACER, MOUNTING	5
5	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-20902-2	. EDGING, (MAKE FROM 04-20249 ON BULK ITEMS LIST CUT TO LENGTH 197±5 MM)	1
6	PAFZZ	PAFZZ	PAFZZ	PAFZZ		30554	DIN6923-M4	. NUT, PLAIN, HEXAGON	5
7	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-174-1235	30554	04-20703	. PLUG, END SEAL	19
8	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-522-4172	30554	04-20708	. CONNECTOR, PLUG 4 PIN	1
9	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-512-1010	11139	04-20707	. WEDGE, PLUG 4 PIN	1
10	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-446-8180	30554	04-20524	. WEDGE, PLUG 2 PIN	1
11	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-447-5814	30554	04-20524	. CONNECTOR, PLUG 2 PIN	1
12	PAFFF	PAFFF	PAFFF	PAFFF	6150-01-586-0566	30554	04-20258	. LEAD, ELECTRICAL A2-TB511 TO GND	1
13	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-00-464-0117	00779	36152	. . TERMINAL, RING #6/M3.5, 22-16 AWG	5
14	MFFZZ	MFFZZ	MFFZZ	MFFZZ		44940	04-20448	. . STRAND, WIRE, (MAKE FROM P/N 3271-16-26 ON BULK ITEMS LIST, CUT TO LENGTH AS NEEDED)	1
15	XBFZZ	XBFZZ	XBFZZ	XBFZZ		53421	TAG22T3-1 00B	. . LAMINATE, LABEL COVER	1
16	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-00-660-3633	81314	MS25036-1 55	. . TERMINAL, RING M12, 16-14 AWG ...	5
17	PAFFF	PAFFF	PAFFF	PAFFF	6150-01-586-0702	30554	04-20254	. HARNESS, WIRING P501 TO K1/ TB501	1
18	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-01-602-8183	30554	04-21578	. . TERMINAL, RING, 1/4 INCH, 22-16 AWG	3
19	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-20447	. . INSULATION SLEEVING, (MAKE FROM EY-1877 ON BULK ITEMS LIST CUT TO LENGTH AS NEEDED)	1

(1)	(2)				(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE				NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
20	MFFZZ	MFFZZ	MFFZZ	MFFZZ		44940	04-20448	. . STRAND, WIRE, (MAKE FROM P/N 3271-16-26 ON BULK ITEMS LIST, CUT TO LENGTH AS NEEDED)	1
21	XBFZZ	XBFZZ	XBFZZ	XBFZZ		53421	TAG9T3-10 0B	. . LAMINATE, LABEL	4
22	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-454-1789	11139	W12S	. . WEDGE, PLUG 12 PIN	2
23	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5999-01-642-4392	30554	04-20514	. . CONTACT, SOCKET, 22-16 AWG	11
24	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-495-3353	45152	7HA302	. . CONNECTOR, PLUG 12 PIN	1
25	PAFFF	PAFFF	PAFFF	PAFFF	6150-01-586-2781	30554	04-20711	. HARNESS, WIRING J511 TO K1/TB501	1
26	MFFZZ	MFFZZ	MFFZZ	MFFZZ		44940	04-20448	. . STRAND, WIRE, (MAKE FROM P/N 3271-16-26 ON BULK ITEMS LIST, CUT TO LENGTH AS NEEDED)	1
27	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-495-3346	45152	8HA889	. . CONNECTOR, PLUG 12 PIN	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 09 POWER PLANT REPAIR PARTS LIST

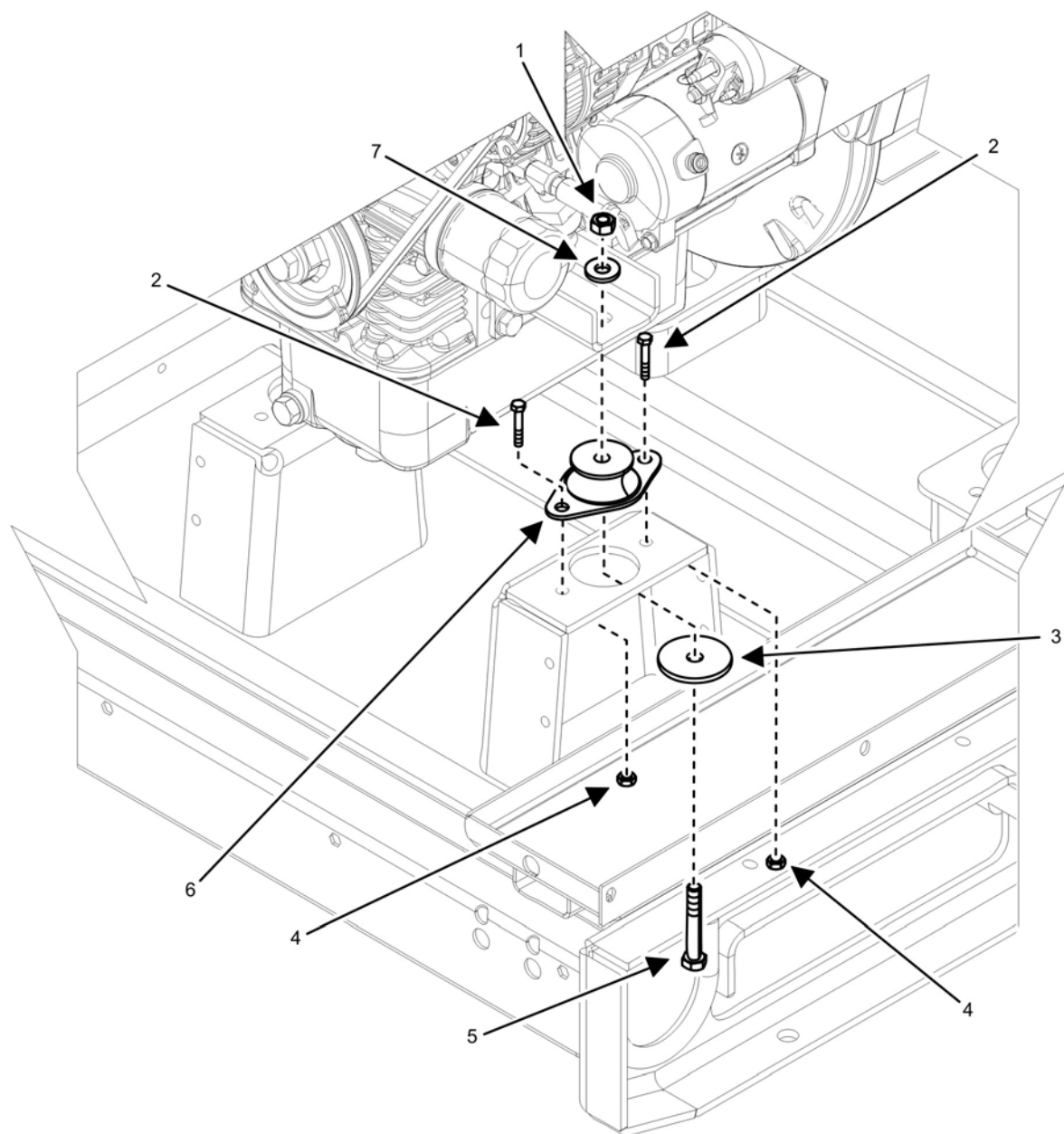


Figure 22. Power Plant (Sheet 1 of 3).

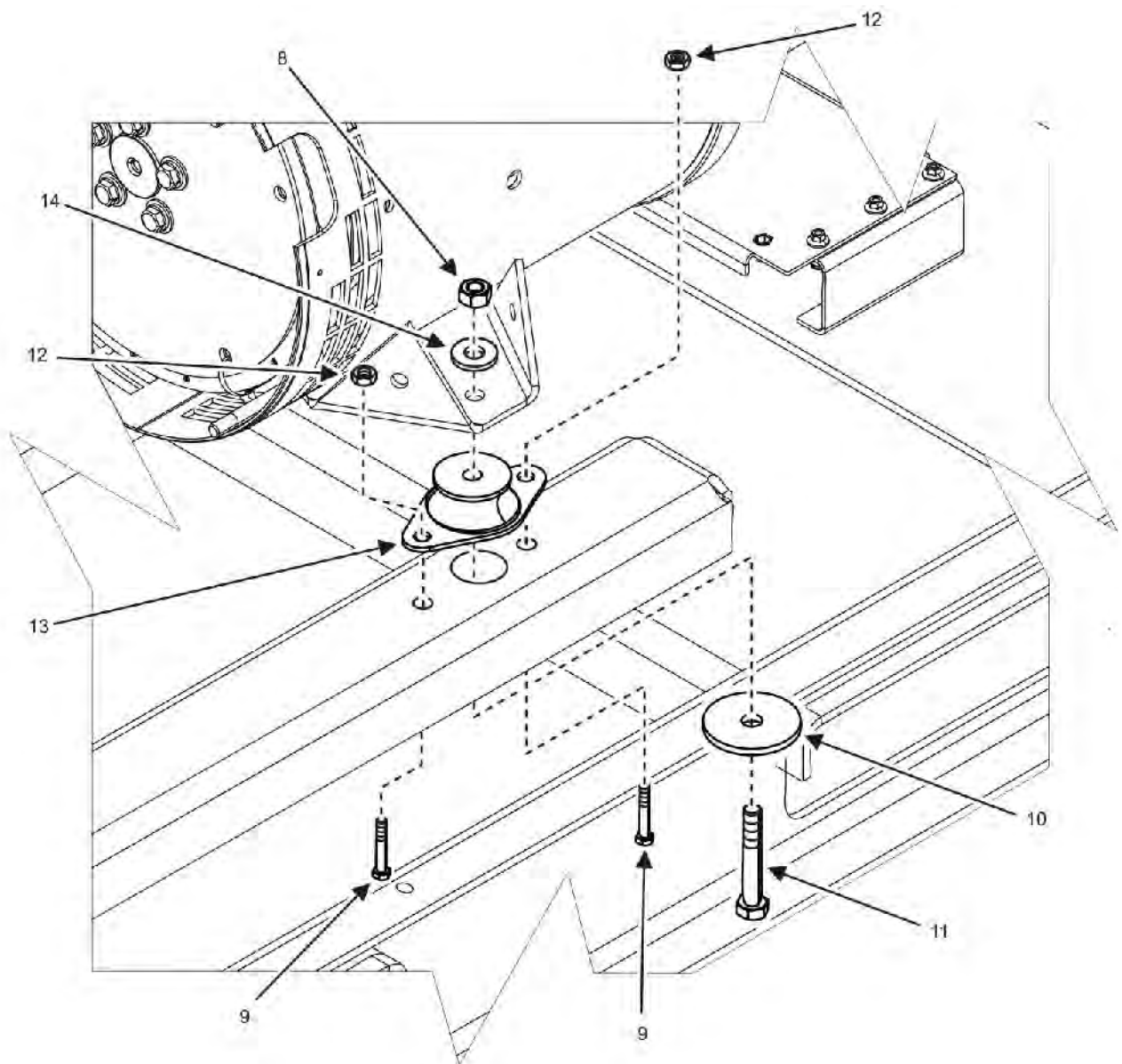


Figure 22. Power Plant (Sheet 2 of 3).

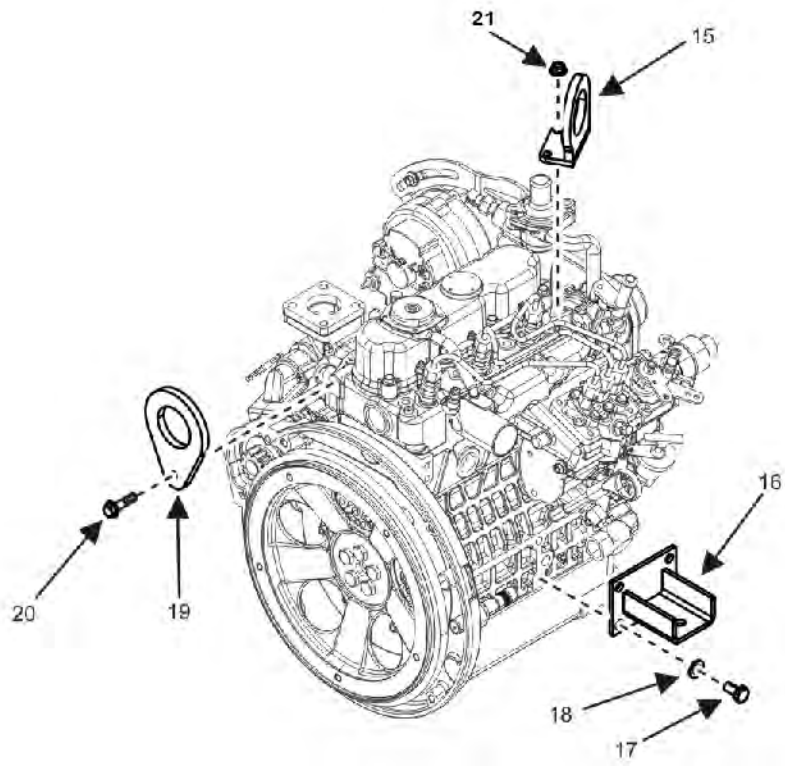


Figure 22. Power Plant (Sheet 3 of 3).

(1)	(2)				(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE				NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
GROUP 09 POWER PLANT									
FIGURE 22 POWER PLANT									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-00-087-4652	30554	M45913/1-6 CGS5C	. NUT, HEX, SELF-LOCKING (3/8-16, GRADE 8)	2
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-596-3693	05047	AES10M08B 025WB4K42	. SCREW, HEX FLANGE (M8X1.25X25) .	4
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-597-3069	30554	04-20749-1	. WASHER, SNUBBING, HARDENED	2
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-642-3008	30554	A035J078	. NUT, HEX FLANGE (M8X1.25)	4
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-619-9837	05047	AEB02C375 B50WA6FY1	. SCREW, HEX HEAD CAP (3/8-16X2.50 GRADE 8)	2
6	PCFZZ	PCFZZ	PCFZZ	PCFZZ	5340-15-900-3805	81860	28137-3	. ISOLATOR, VIBRATION, ENGINE MOUNT	2
7	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-620-9610	05047	AEW01X375 000BD6AQ1	. WASHER, FLAT (3/8 HARDENED)	2
8	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-633-9835	97403	13230E638 2-8	. NUT, HEXAGON	2
9	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-620-3113	2V507	92461A500	. . . SCREW, HEX FLANGE (M10X1.5X30)	4
10	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-586-0557	30554	04-20749-2	. WASHER, SNUBBING, HARDENED	2
11	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-596-3640	05047	AES01C438 B75WA6FY1	. BOLT, HEX HEAD (7/16-14, GRADE 8)	2
12	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-620-3113	05047	92461A500	. NUT, HEX FLANGE (M10X1.5)	4
13	PCFZZ	PCFZZ	PCFZZ	PCFZZ	5340-01-590-3805	81860	29550-4	. ISOLATOR, VIBRATION, ALTERNA-TOR MOUNT	2
14	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-598-3316	05047	AEW01X437 000BD6AQ1	. WASHER, FLAT (7/16, HARDENED)	2
15	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20103	. BRACKET, ENGINE LIFTING	1
16	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20417	. BRACKET, ENGINE MOUNTING	2
17	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-596-3651	05047	AES07M10B 020WB4K41	. SCREW, HEX HEAD (M10X1.25X20) ...	8
18	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-12-125-0048	D8286	DIN126-11-100HV	. WASHER, FLAT (M10)	8
19	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20072	. BRACKET, ENGINE LIFTING	1
20	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-500-4266	0XWR1	01123-6081 6	. BOLT	1

(1)	(2)				(3)	(4)	(5)	(6)	(7)
SMR CODE									
	a.	b.	c.	d.					
ITEM	AIR					PART	DESCRIPTION AND		
NO.	ARMY	FORCE	NAVY	USMC	NSN	CAGEC	NUMBER	USABLE ON CODE (UOC)	QTY
21	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-598-0222	05047	AEN18M08B 000BA7H91	NUT, HEX, FLANGE (M8X1.25)	2
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE

GROUP 0901 AC GENERATOR ASSEMBLY, 50/60 HZ REPAIR PARTS LIST

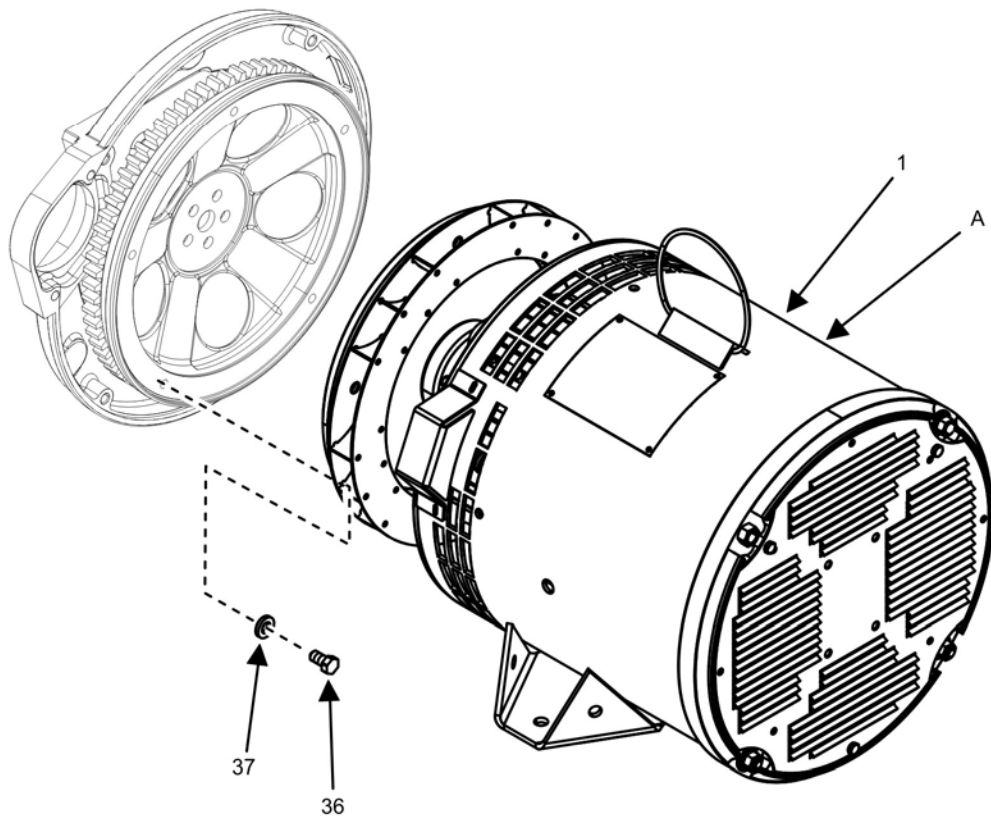


Figure 23. AC Generator Assembly, 50/60 Hz (Sheet 1 of 3).

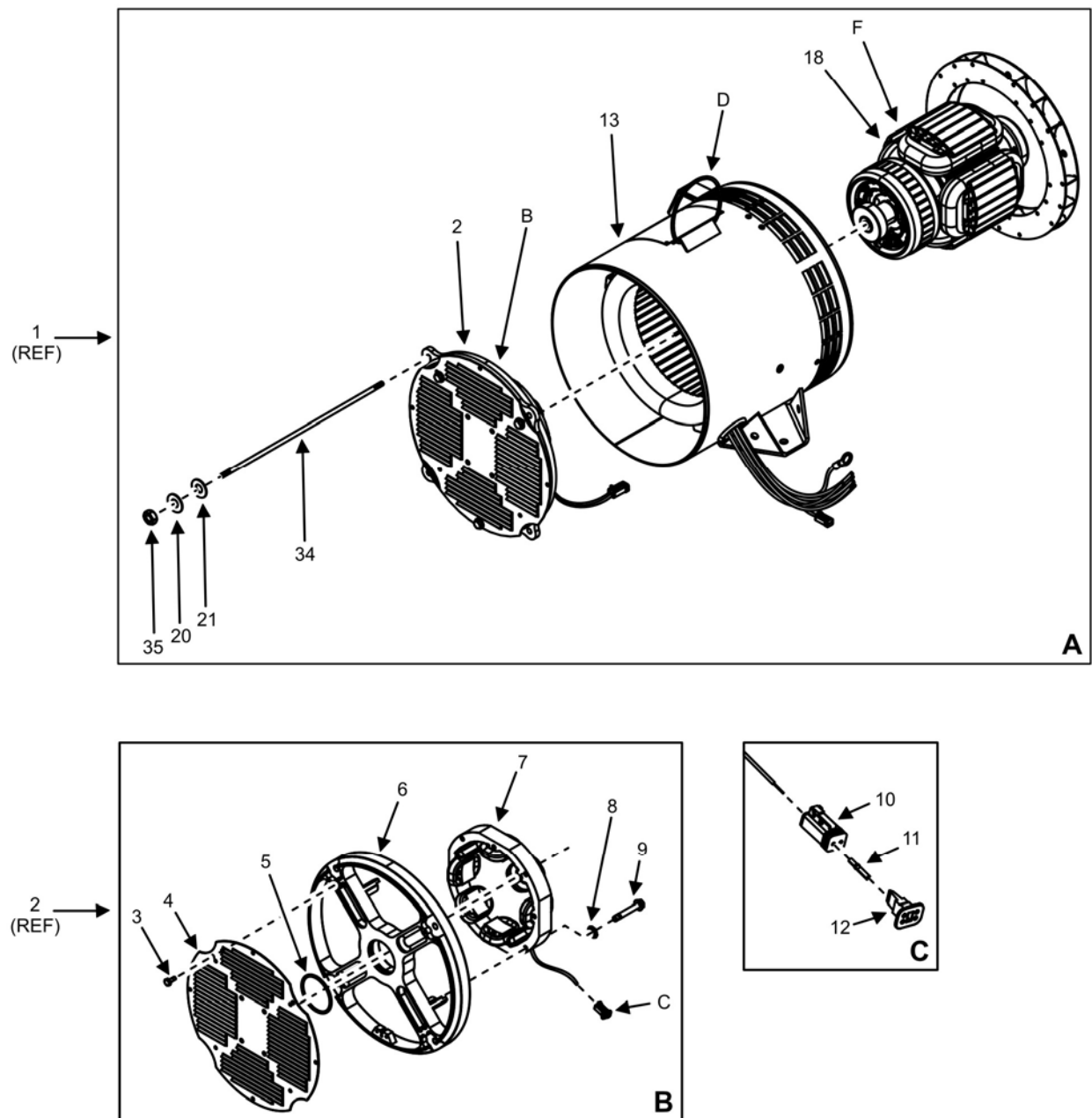


Figure 23. AC Generator Assembly, 50/60 Hz (Sheet 2 of 3).

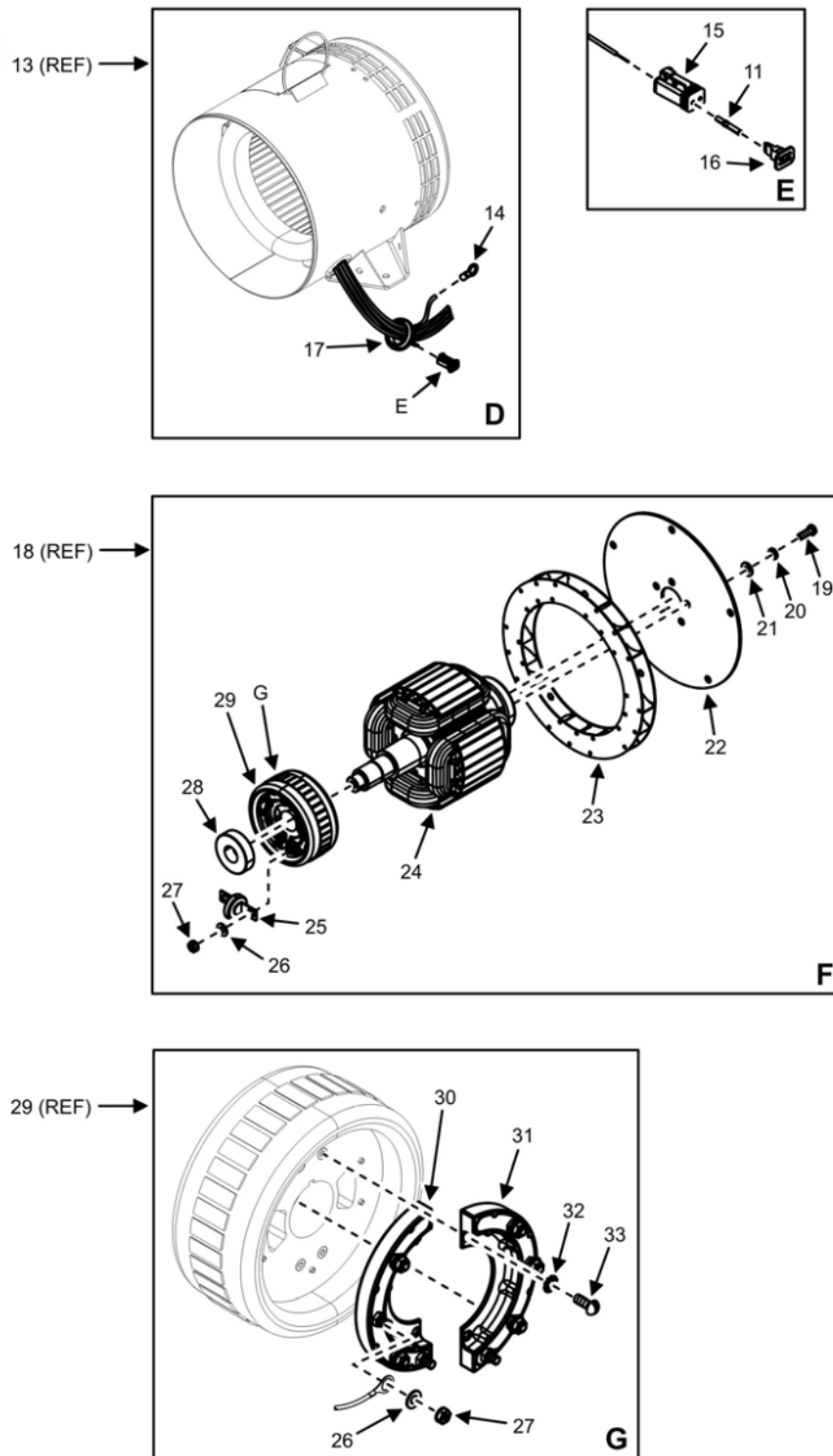


Figure 23. AC Generator Assembly, 50/60 Hz (Sheet 3 of 3).

(1)	(2)				(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE				NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
GROUP 0901 AC GENERATOR ASSEMBLY, 50/60 HZ									
FIGURE 23 AC GENERATOR ASSEMBLY, 50/60 HZ									
1	PAFHH	PAFHH	PAFDD	PAFDD	6115-01-598-1557	53YZ8	0200-3218-01	. GENERATOR ASSEMBLY, 5 KW, 50/60 HZ UOC: 98E	1
2	PAFFF	PAFFF	PAFFF	PAFFF	2815-01-640-9828	53YZ8	A026F712	. ENDBELL ASSEMBLY UOC: 98E	1
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-339-0822	30554	815-0181	. . SCREW, CAP, HEXAGON HEAD UOC: 98E	3
4	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	88-20230	. . COVER, INLET UOC: 98E	1
5	PCFZZ	PCFZZ	PCFZZ	PCFZZ	5331-00-973-8598	30554	509-0094	. . O-RING UOC: 98E	1
6	XAFZZ	XAFZZ	XAFZZ	XAFZZ		53YZ8	0211-0435	. . ENDBELL UOC: 98E	1
7	PAFZZ	PAFZZ	PAFZZ	PAFZZ	6115-01-588-7288	30554	A026F710	. . STATOR, EXCITER UOC: 98E	1
8	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-077-9650	30554	853-0013	. . WASHER, LOCK UOC: 98E	4
9	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-366-1153	30554	815-0774	. . SCREW, TAPPING UOC: 98E	4
10	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-506-5555	11139	DT04-2P	. . CONNECTOR, PLUG, RECEPTACLE UOC: 98E	1
11	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5999-01-590-5769	30554	04-20513	. . CONTACT, ELECTRICAL UOC: 98E	2
12	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-519-1808	11139	04-20523	. . RETAINER, ELECTRICAL, CONNEC- TOR UOC: 98E	1
13	XBFFF	XBFFF	XBFFF	XBFFF		53YZ8	A026E304	. STATOR, GENERATOR UOC: 98E	1
14	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-00-617-2896	00779	36160	. . TERMINAL LUG UOC: 98E	12
15	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-586-0093	30554	0323-2538	. . CONNECTOR, PLUG, ELECTRICAL UOC: 98E	1
16	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-446-8180	30554	04-20524	. . CONNECTOR BODY, PLUG, ELEC- TRICAL UOC: 98E	1

(1) ITEM NO.	(2) SMR CODE				(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
17	PCFZZ	PCFZZ	PCFZZ	PCFZZ	4730-01-109-7901	30554	503-0183	. . GROMMET UOC: 98E	1
18	PAFHH	PAFHH	PAFFF	PAFFF	6115-01-597-6218	30554	A040N866	. GENERATOR,ALTERNATING CUR- RENT-DIRECT CURRENT UOC: 98E	1
19	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-174-2761	30554	0800-0050	. . SCREW, CAP, HEXAGON HEAD UOC: 98E	5
20	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-060-9104	30554	0850-0050	. . WASHER, LOCK UOC: 98E	9
21	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-587-8556	30554	0526-0390	. . WASHER, FLAT UOC: 98E	9
22	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4820-01-591-6101	30554	88-20225	. . DISC, DRIVE UOC: 98E	1
23	XBHZZ	XBHZZ	XBFZZ	XBFZZ		53YZ8	A030S159	. . FAN UOC: 98E	1
24	XAFZZ	XAFZZ	XAFZZ	XAFZZ		53YZ8	0201-3650- 01	. . ROTOR, ASSEMBLY, WOUND UOC: 98E	1
25	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5905-01-329-1699	30554	304-0807	. . RESISTOR, VOLTAGE SENSITIVE UOC: 98E	1
26	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-051-8089	30554	526-0008	. . WASHER, FLAT UOC: 98E	12
27	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-049-2745	30554	870-0131	. . NUT, PLAIN, ASSEMBLED UOC: 98E	8
28	PAFZZ	PAFZZ	PAFZZ	PAFZZ	3110-01-160-9663	30554	510-0112	. . BEARING, ROTOR UOC: 98E	1
29	XAFFF	XAFFF	XAFFF	XAFFF	6115-01-587-7589	30554	A026J838	. . EXCITER, ROTOR UOC: 98E	1
30	XBFZZ	XBFZZ	XBFZZ	XBFZZ		53YZ8	A034L400	. RECTIFIER, POSITIVE UOC: 98E	1
31	PAFZZ	PAFZZ	PAFZZ	PAFZZ		53YZ8	A032X895	. RECTIFIER, NEGATIVE UOC: 98E	1
32	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-060-7181	30554	853-0008	. WASHER, LOCK UOC: 98E	4
33	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-190-4461	30554	813-0100	. SCREW UOC: 98E	4
34	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-630-3956	53YZ8	A026C355	. STUD UOC: 98E	4
35	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-00-480-8509	30554	862-0003	. NUT, PLAIN, HEXAGON HEAD UOC: 98E	4

(1)	(2)				(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE				NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
36	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-591-6658	30554	04-20769-1	. BOLT, MACHINE UOC: 98E	5
37	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-596-3757	05047	AEW24X37 N062BD6F Y1	. WASHER, FLAT UOC: 98E	5
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 0901 AC GENERATOR ASSEMBLY, 400 HZ REPAIR PARTS LIST

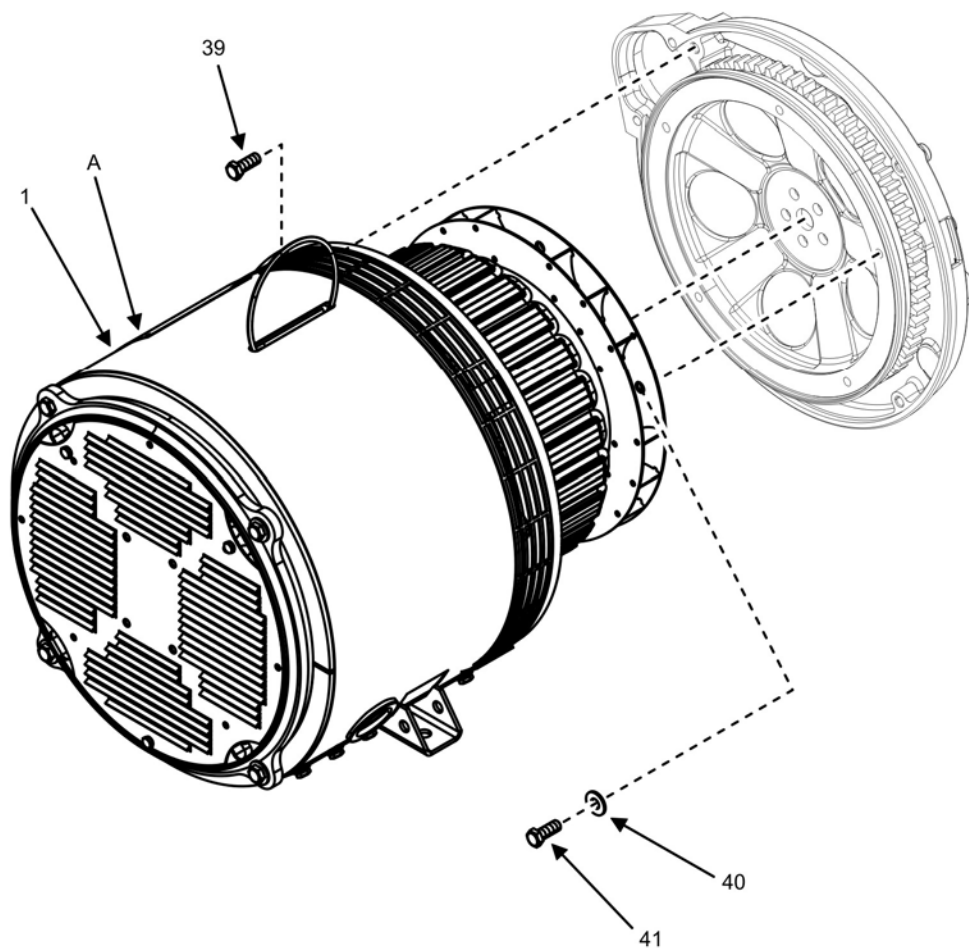


Figure 24. AC Generator Assembly, 400 Hz (Sheet 1 of 3).

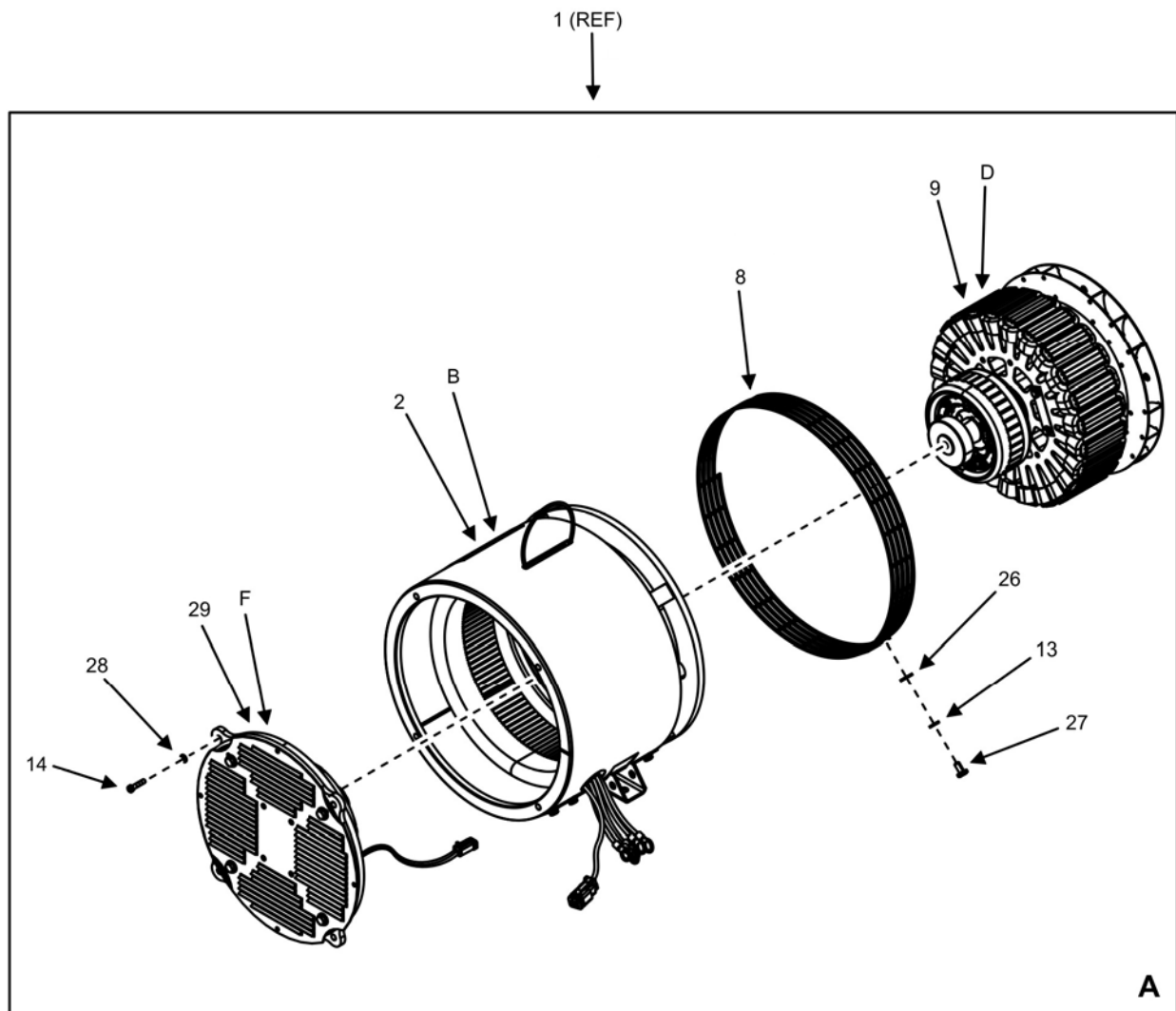


Figure 24. AC Generator Assembly, 400 Hz (Sheet 2 of 3).

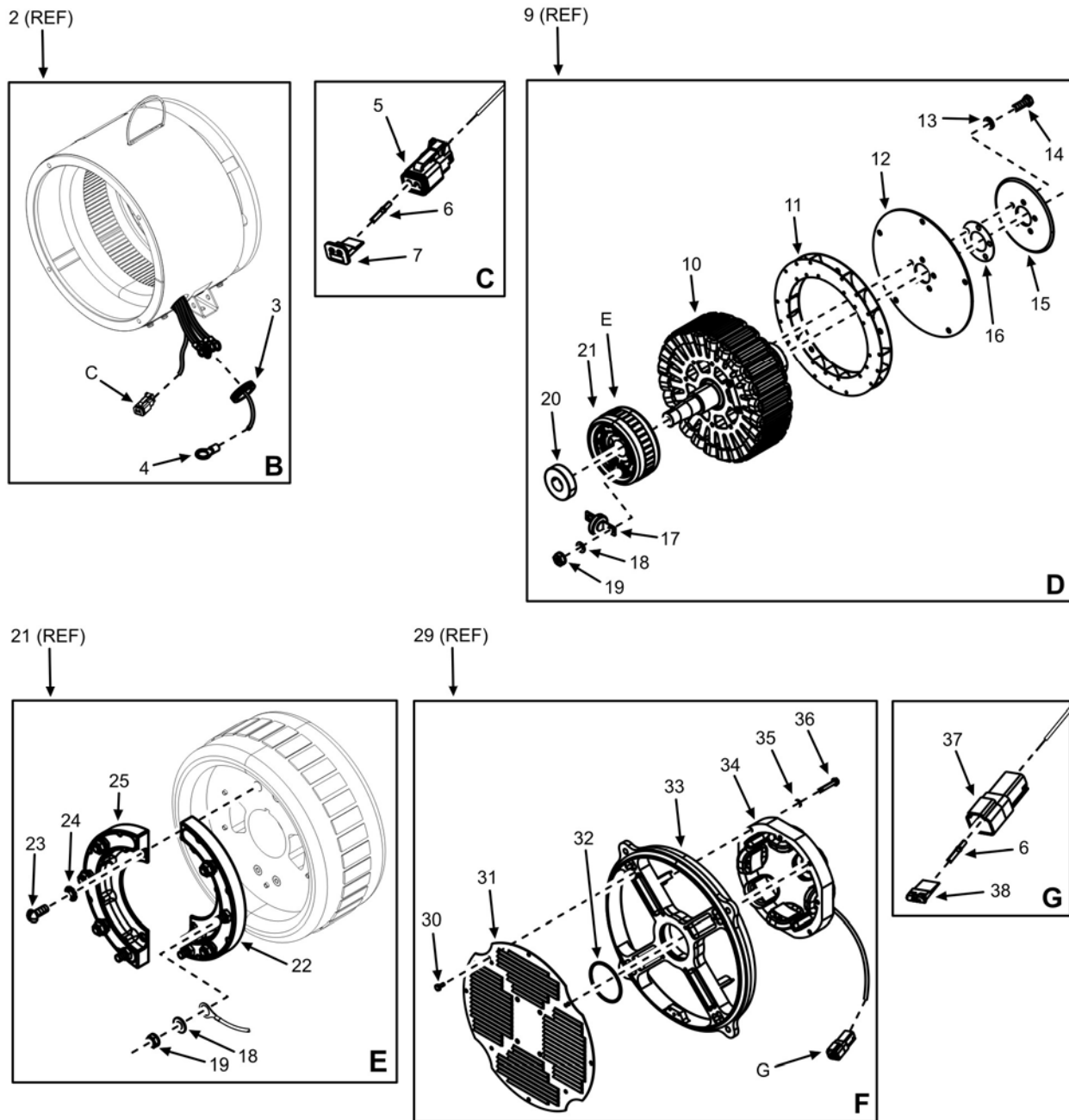


Figure 24. AC Generator Assembly, 400 Hz (Sheet 3 of 3).

(1) ITEM NO.	(2) SMR CODE				(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
								GROUP 0901 AC GENERATOR ASSEMBLY, 400 HZ	
								FIGURE 24 AC GENERATOR ASSEM- BLY, 400 HZ	
1	PAFHH	PAFHH	PAFFF	PAFFF	6115-01-597-6672	53YZ8	0200-3219-01	. GENERATOR ASSEMBLY, 5 KW, 400 HZ UOC: 98F	1
2	XBFHH	XBFHH	XBFFF	XBFFF		53YZ8	A026E310	. . STATOR, GENERATOR UOC: 98F	1
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ		53YZ8	0508-0055	. . . GROMMET UOC: 98F	1
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-00-617-2896	00779	36160	. . . TERMINAL LUG UOC: 98F	12
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-586-0093	30554	0323-2538	. . CONNECTOR, PLUG, ELECTRICAL UOC: 98F	1
6	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5999-01-590-5769	30554	04-20513	. . CONTACT, ELECTRICAL UOC: 98F	2
7	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-446-8180	30554	04-20524	. . CONNECTOR BODY, PLUG, ELEC- TRICAL UOC: 98F	1
8	XAFZZ	XAFZZ	XAFZZ	XAFZZ		53YZ8	0234-0895	. . SCREEN ASSEMBLY UOC: 98F	1
9	XBFHH	XBFHH	XBFFF	XBFFF		53YZ8	A026H431	. . ROTOR, GENERATOR UOC: 98F	1
10	XAFZZ	XAFZZ	XAFZZ	XAFZZ		53YZ8	A026G777	. . . ROTOR, ASSEMBLY, WOUND UOC: 98F	1
11	XBHZZ	XBHZZ	XBZZZ	XBZZZ		53YZ8	A030X159	. . . FAN UOC: 98F	1
12	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4820-01-591-6101	30554	88-20225	. . . DISC, DRIVE UOC: 98F	1
13	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-009-6570	30554	0850-0040	. . . WASHER, LOCK UOC: 98F	5
14	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-174-2761	30554	0800-0050	. . . SCREW, HEXAGON HEAD UOC: 98F	9
15	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2815-01-595-7518	30554	88-20227	. . . DISC, RETENTION UOC: 98F	1
16	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2815-01-595-7311	30554	88-20226	. . . SPACER, ROTOR RETAINER UOC: 98F	1

(1) ITEM NO.	(2) SMR CODE				(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
17	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5905-01-329-1699	44940	304-0807	... RESISTOR, VOLTAGE SENSITIVE UOC: 98F	1
18	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-051-8089	44940	526-0008	... WASHER, FLAT UOC: 98F	12
19	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-049-2745	44940	870-0131	... NUT, PLAIN, ASSEMBLED UOC: 98F	8
20	PAFZZ	PAFZZ	PAFZZ	PAFZZ	3110-00-004-1405	53YZ8	5100102	... BEARING, ROTOR UOC: 98F	1
21	XAFFF	XAFFF	XAFFF	XAFFF	6115-01-587-7589	44940	A026J838	... EXCITER, ROTOR UOC: 98F	1
22	PAFZZ	PAFZZ	PAFZZ	PAFZZ		53YZ8	A032X895	... RECTIFIER, NEGATIVE UOC: 98F	1
23	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-190-4461	44940	813-0100	... SCREW UOC: 98F	4
24	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-060-7181	44940	853-0008	... WASHER, LOCK UOC: 98F	4
25	XBFZZ	XBFZZ	XBFZZ	XBFZZ		53YZ8	A034L400	... RECTIFIER, POSITIVE UOC: 98F	1
26	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-370-0052	44940	0526-0015	... WASHER, FLAT UOC: 98F	1
27	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-062-3344	44940	0800-0003	... SCREW UOC: 98F	1
28	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-587-8556	44940	0526-0390	... WASHER, FLAT UOC: 98F	4
29	XBFHH	XBFHH	XBFFF	XBFFF		53YZ8	A026F713	... ENDBELL ASSEMBLY UOC: 98F	1
30	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-339-0822	44940	815-0181	... SCREW, CAP, HEXAGON HEAD UOC: 98F	3
31	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	88-20230	... COVER, INLET UOC: 98F	1
32	XCFZZ	XCFZZ	XCFZZ	XCFZZ		44940	509-0099	... O-RING UOC: 98F	1
33	XAFZZ	XAFZZ	XAFZZ	XAFZZ		53YZ8	0211-0427	... ENDBELL UOC: 98F	1
34	XAHZZ	XAHZZ	XAFZZ	XAFZZ	6115-01-588-7288	44940	A026F710	... STATOR, EXCITER UOC: 98F	1
35	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-077-9650	44940	853-0013	... WASHER, LOCK UOC: 98F	4
36	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-366-1153	44940	815-0774	... SCREW, TAPPING UOC: 98F	4

(1)	(2)				(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE				NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
37	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-506-5555	11139	DT04-2P	. . CONNECTOR, PLUG, RECEPTACLE UOC: 98F	1
38	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-519-1808	11139	04-20523	. . RETAINER, ELECTRICAL, CONNEC- TOR UOC: 98F	1
39	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-597-1559	81343	SAEJ58	. SCREW, FLANGE HEAD UOC: 98F	4
40	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-596-3757	05047	AEW24X37 N062BD6F Y1	. WASHER, FLAT UOC: 98F	5
41	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-591-6658	30554	04-20769-1	. BOLT, MACHINE UOC: 98F	5
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 0902 ENGINE ASSEMBLY REPAIR PARTS LIST

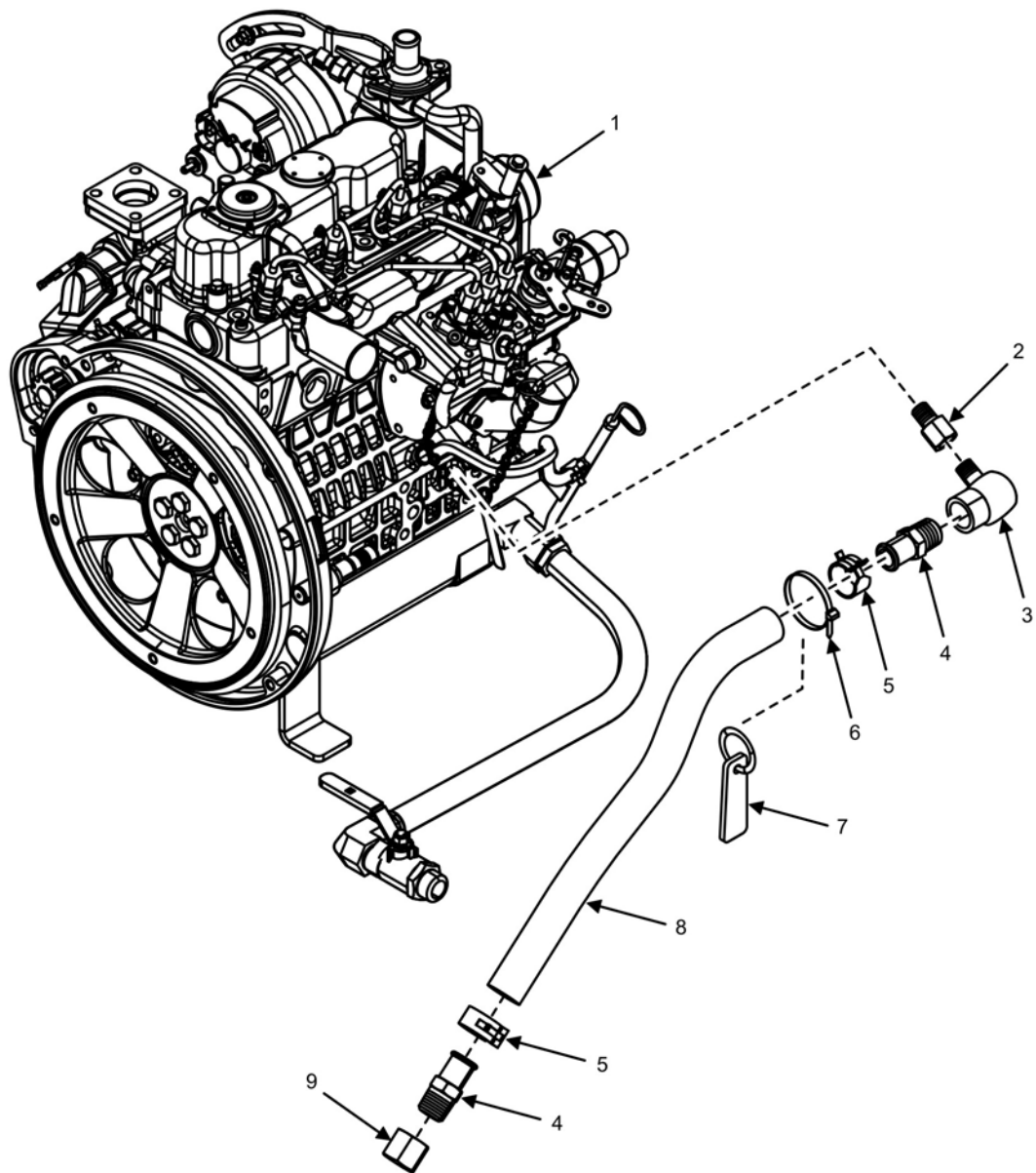


Figure 25. Engine Assembly (Sheet 1 of 2).

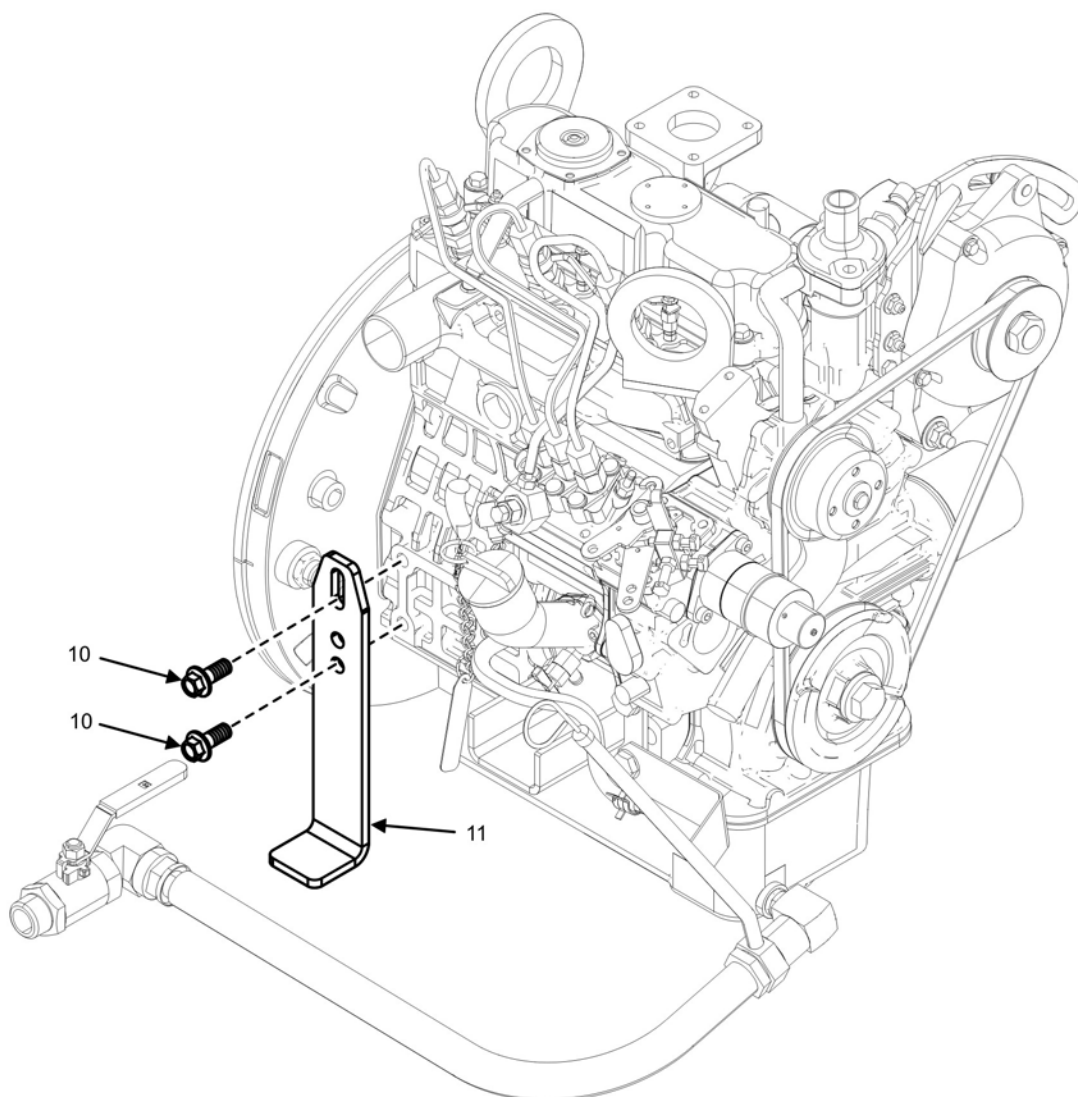


Figure 25. Engine Assembly (Sheet 2 of 2).

(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 0902 ENGINE ASSEMBLY									
FIGURE 25 ENGINE ASSEMBLY									
1	PAFHH	PAFHH	PAFDD	PAFDD	2815-01-597-5235	30554	04-20157	. ASSEMBLY, ENGINE, (SEE FIGURES 26 THROUGH 42 AND 46 FOR PARTS BREAKDOWN)	1
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-590-1311	98441	1/4X1/4 F3 HG	. ADAPTER, STRAIGHT	1
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-559-7103	81343	SAEJ5144-8 140239C	. ELBOW, MALE FEMALE	1
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-593-8660	81343	SAE J1231 8-12 43016 0B	. ADAPTER, TUBE	2
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-596-7215	81343	SAEJ1508C TB-27	. CLAMP, TYPE CTB	2
6	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5975-01-588-6525	06383	PLT4S-M30	. TIE, CABLE	1
7	PAFZZ	PAFZZ	PAFZZ	PAFZZ	9905-01-631-9978	30554	04-21599	. LABEL, INFORMATION COOLANT DRAIN HOSE	1
8	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4720-01-603-2689	30554	04-21832-2	. HOSE, COOLANT, ENGINE	1
9	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-407-9298	93061	213P-8	. CAP, PIPE	1
10	PAFZZ	PAFZZ	PAFZZ	PAFZZ		30554	AES10N10C 025WB4K42	. SCREW, HEX FLANGE HEAD	4
11	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2590-01-641-2083	30554	04-21732	. SUPPORT, ENGINE 5KW	2
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 090201 LUBRICATION SYSTEM REPAIR PARTS LIST

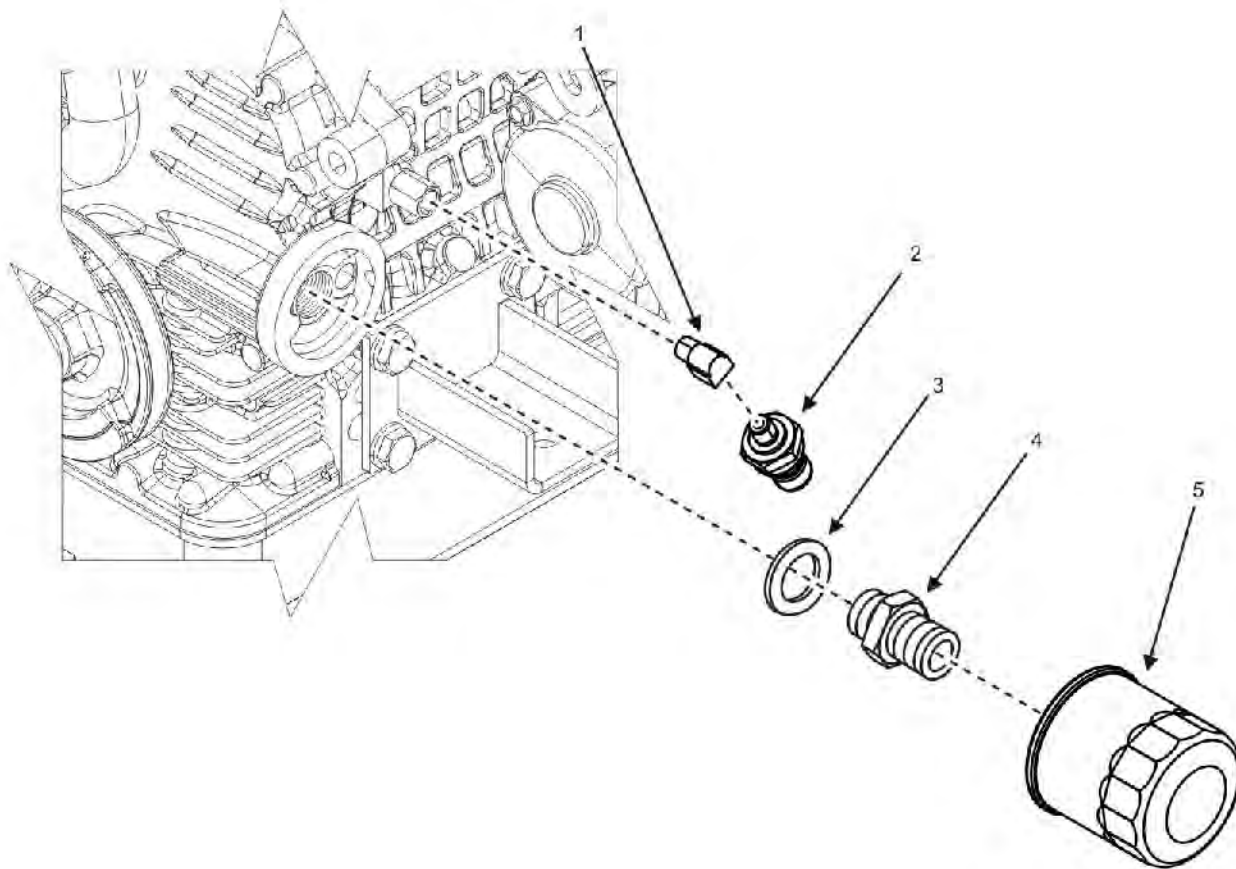


Figure 26. Lubrication System (Sheet 1 of 3).

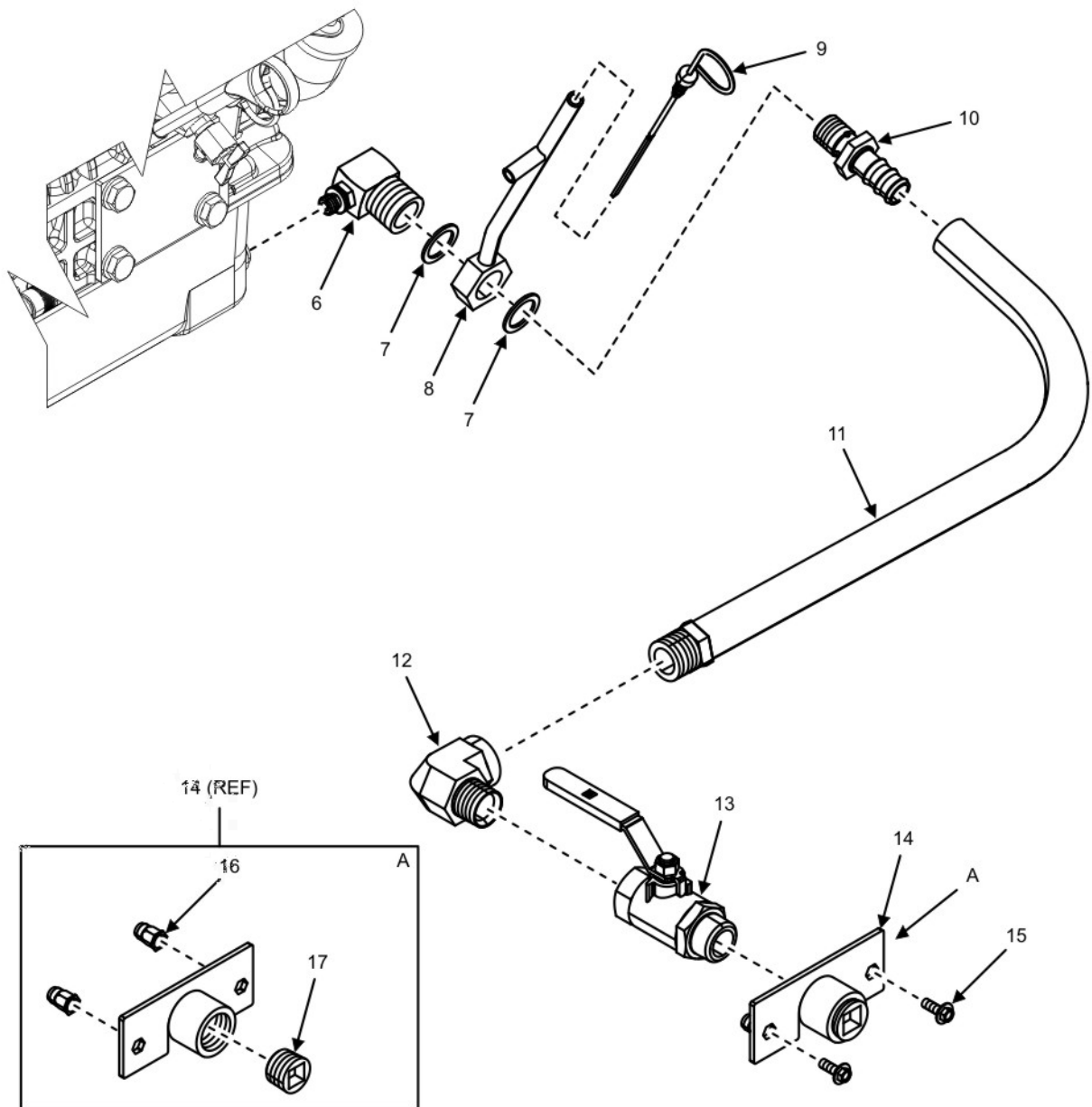


Figure 26. Lubrication System (Sheet 2 of 3).

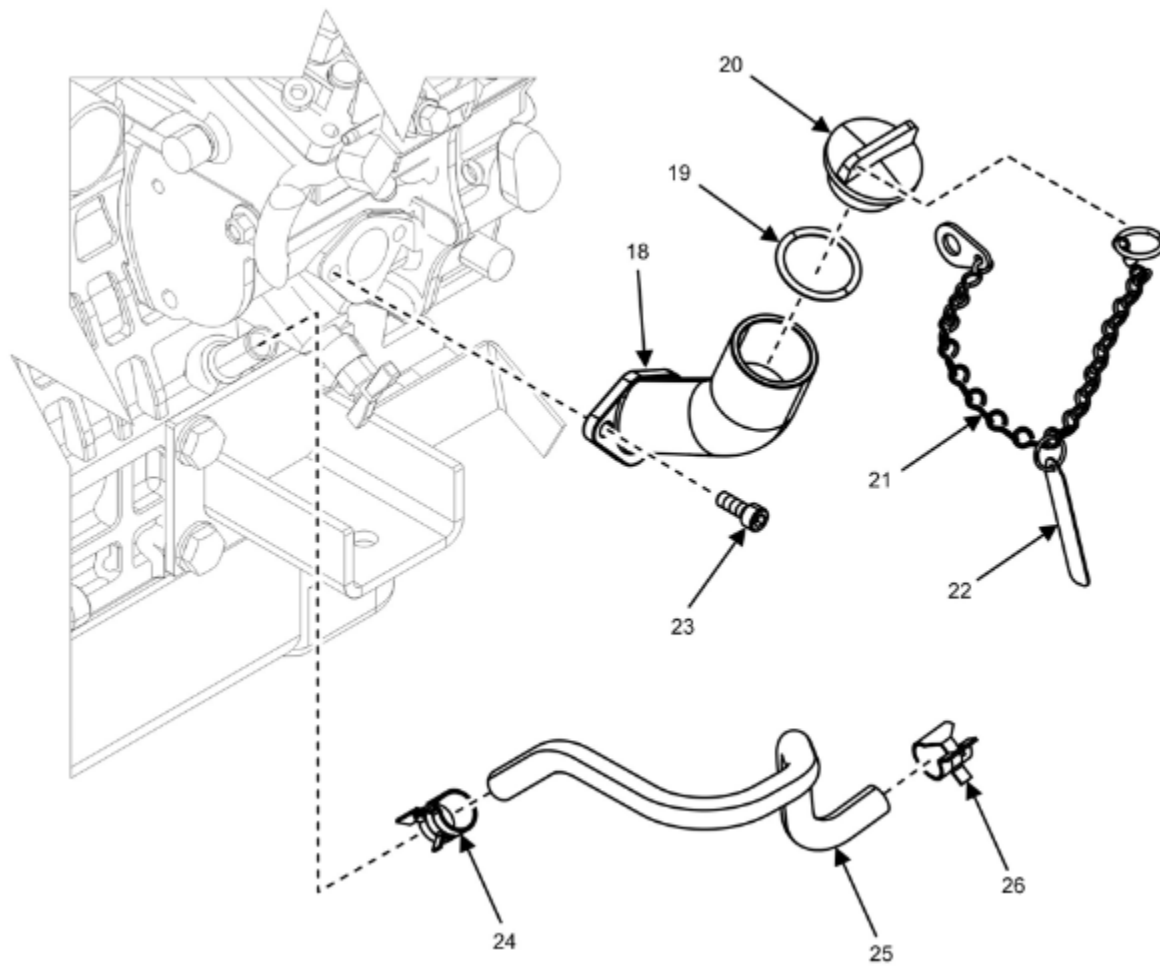


Figure 26. Lubrication System (Sheet 3 of 3).

(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 090201 LUBRICATION SYSTEM									
FIGURE 26 LUBRICATION SYSTEM									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-00-639-9730	81343	SAE J530 2-2 130239B	. ELBOW, PIPE	1
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	6620-01-598-2271	22863	P4055-500 1-1	. SENDER, OIL PRESSURE	1
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-537-0005	0XWR1	15841-9401 -0	. WASHER, PLAIN	1
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-366-9017	30554	88-22307	. ADAPTER, STRAIGHT	1
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2940-01-573-9124	0XWR1	HH150-324	. FILTER, ENGINE OIL	1
6	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-643-7372	30554	04-21897	. ELBOW, 90 DEGREE	1
7	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-557-7264	0AK42	22190-2200 02	. WASHER, SEAL	2
8	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2590-01-641-2083	30554	04-21763	. TUBE, DIPSTICK	1
9	PAFZZ	PAFZZ	PAFZZ	PAFZZ	6680-01-595-7336	30554	04-21452	. DIPSTICK, ENGINE OIL	1
10	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-630-9887	30554	04-21742	. ADAPTER, BANJO	1
11	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4720-01-614-1309	30554	04-21529-1	. HOSE, OIL DRAIN	1
12	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-333-0914	30780	3/ 4 CD-S	. FITTING, ELBOW	1
13	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4820-01-587-8062	93061	XV501P-12	. VALVE, STOP CHECK	1
14	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20162	. BULKHEAD, OIL DRAIN HOSE	1
15	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-592-1168	30554	AES10M06A 020WB4K42	. SCREW, CAP, HEXAGON HEAD	2
16	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5325-01-589-3727	F3A26	639101-760 30	. NUT, CLINCH	2
17	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-596-6482	30554	04-20166	. PLUG, PIPE	1
18	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4710-01-592-9384	30554	04-20367	. TUBING, METALLIC	1
19	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5331-01-546-8126	0AK42	24311-0003 20	. O-RING	1
20	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-634-0030	30554	04-21815	. CAP, FILLER OPENING	1
21	XBFZZ	XBFZZ	XBFZZ	XBFZZ	4020-01-592-7898	30554	04-21295	. LANYARD, OIL FILL CAP	1
22	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21299	. PLATE, ENGINE OIL CHANGE	1

(1)	(2)				(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE				NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
23	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-12-181-5223	D8286	DIN912-M6X 16-12.9-A2P	. SCREW, SOCKET HEAD CAP (M6X1.0X16)	4
24	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-596-1298	81343	SAE J1508 CTB-16	. CLAMP TYPE CTB	1
25	PAFZZ	PAFZZ	PAFZZ	PAFZZ		30554	04-21869	. HOSE, DIPSTICK VENT	1
26	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-595-5751	81343	SAE J1508 CTB-17	. CLAMP TYPE CTB	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 090202 ENGINE SPEED SENSOR REPAIR PARTS LIST

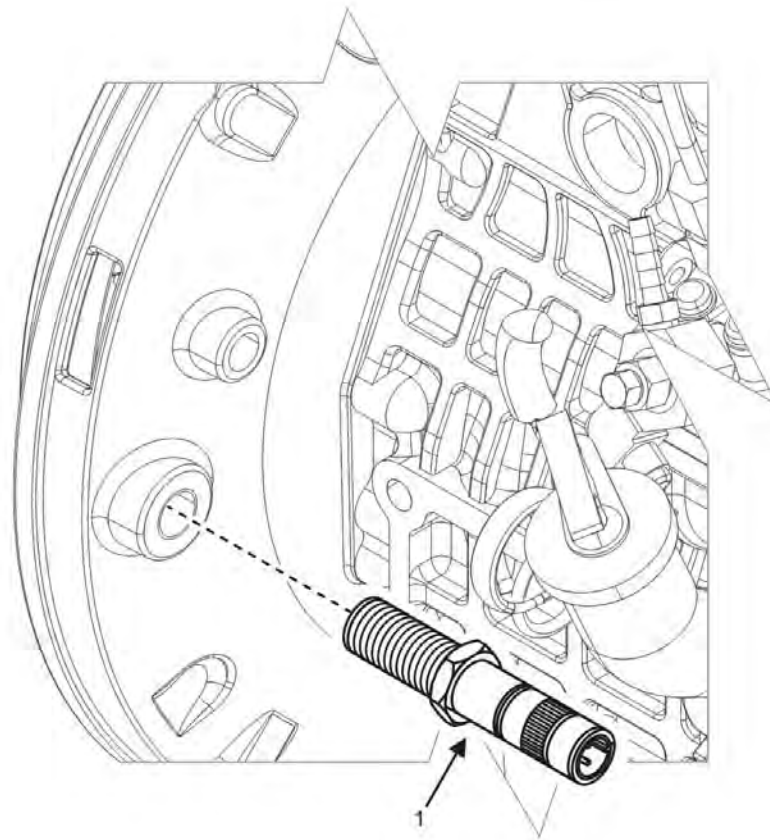


Figure 27. Engine Speed Sensor.

(1)	(2)				(3)	(4)	(5)	(6)	(7)
SMR CODE									
	a.	b.	c.	d.					
ITEM	AIR					PART	DESCRIPTION AND		
NO.	ARMY	FORCE	NAVY	USMC	NSN	CAGEC	NUMBER	USABLE ON CODE (UOC)	QTY
GROUP 090202 ENGINE SPEED SEN- SOR									
FIGURE 27 ENGINE SPEED SENSOR									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2815-01-597-2562	30554	04-20147	. SENSOR, MAGNETIC SPEED	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 090203 GLOW PLUGS REPAIR PARTS LIST

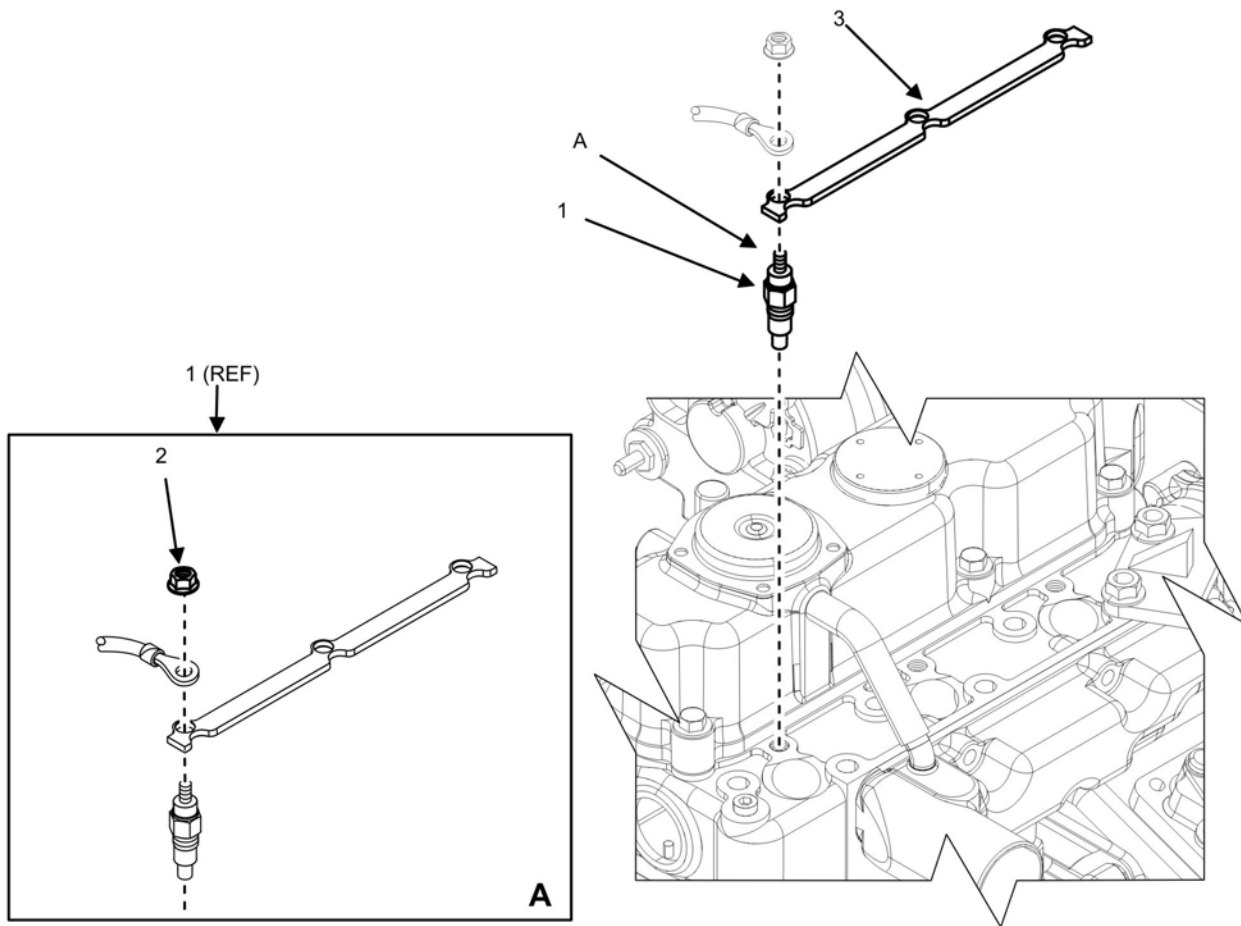


Figure 28. Glow Plugs.

(1)	(2)				(3)	(4)	(5)	(6)	(7)
SMR CODE									
	a.	b.	c.	d.					
ITEM	AIR					PART		DESCRIPTION AND	
NO.	ARMY	FORCE	NAVY	USMC	NSN	CAGEC	NUMBER	USABLE ON CODE (UOC)	QTY
GROUP 090203 GLOW PLUGS									
FIGURE 28 GLOW PLUGS									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2920-01-478-7511	OXWR1	16881-6551 2	. GLOW PLUG	3
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-440-6749	S4532	02761-5004 -0	. NUT, SLEEVE	3
3	PAFFF	PAFFF	PAFFF	PAFFF	6145-01-588-6873	OXWR1	1G962-655 6-0	. CORD, GLOW PLUG	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 090204 FUEL INJECTORS REPAIR PARTS LIST

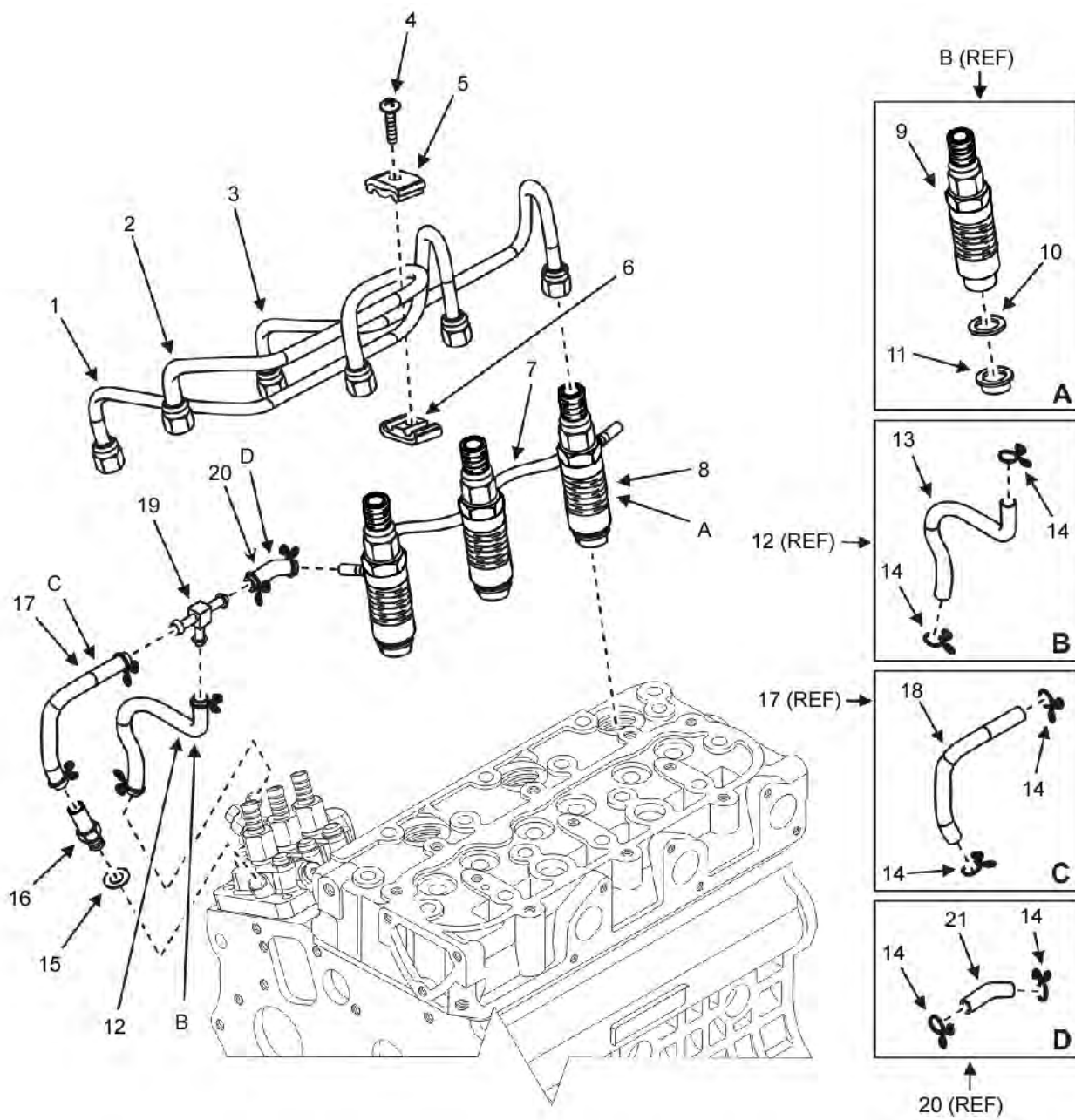


Figure 29. Fuel Injectors.

(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 090204 FUEL INJECTORS FIGURE 29 FUEL INJECTORS									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2815-01-597-6535	OXWR1	1G460-537 1-2	. PIPE, INJECTION	1
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2815-01-597-6536	OXWR1	1G460-537 2-3	. PIPE, INJECTION	1
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4710-01-592-7294 email J Vargas 03/2021		OXWR1	1G460-537 3-2	1
					4720-01-620-5399 7.5 kw		3-2		1
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-533-3695	1Q0C4	03024-5052 0	. SCREW, ASSEMBLED WASHER	2
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-434-3361	67271	322136	. CLAMP, HOSE SPECIAL	2
6	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-434-3360	67271	322135	. CLAMP, HOSE SPECIAL	2
7	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4710-01-597-6532	OXWR1	1G962-425 0-0	. ASSEMBLY, PIPE, OVERFLOW	1
8	PAFFF	PAFFF	PAFFF	PAFFF	4730-01-586-9235	OXWR1	16001-5390 -0	. ASSEMBLY, FUEL INJECTOR	3
9	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2910-01-500-8991	OXWR1	16001-5300 0	. . INJECTOR, FUEL	3
10	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5330-01-507-2967	5X475	15841-5362 -2	. . GASKET	3
11	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5330-01-431-3620	31013	19077-5365 0	. . SEAL, PLAIN ENCASED	3
12	PAFFF	PAFFF	PAFFF	PAFFF	4710-01-587-0644	OXWR1	16809-4250 -0	. ASSEMBLY, TUBE, FUEL	1
13	XBFZZ	XBFZZ	XBFZZ	XBFZZ		OXWR1	109661-4013 0	. . TUBE, FUEL	1
14	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-533-9478	1Q0C4	14971-4275 -0	. . CLIP, PIPE	6
15	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5330-01-478-4911	OXWR1	15601-9665 0	. GASKET	1
16	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2910-01-439-4915	67271	322123	. SCREW, AIR BLEEDER	1
17	PAFFF	PAFFF	PAFFF	PAFFF	4710-01-587-0639	OXWR1	16809-4203 -0	. ASSEMBLY, TUBE, FUEL, (INCLUDES ITEMS 16 AND ITEM 20)	1
18	XBFZZ	XBFZZ	XBFZZ	XBFZZ		OXWR1	109661-4008 5	. . TUBE, FUEL	1
19	XBFZZ	XBFZZ	XBFZZ	XBFZZ		OXWR1	1G065-423 6-0	. JOINT, T-PIPE	1

(1)	(2)				(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE				NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
20	PAFFF	PAFFF	PAFFF	PAFFF	4710-01-587-0647	OXWR1	16809-4202 -0	. ASSEMBLY, TUBE, FUEL, (INCLUDES ITEMS 16 AND ITEM 23)	1
21	XBFZZ	XBFZZ	XBFZZ	XBFZZ		OXWR1	09661-4004 0	. . TUBE, FUEL	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 090205 SPEED CONTROL PLATE REPAIR PARTS LIST

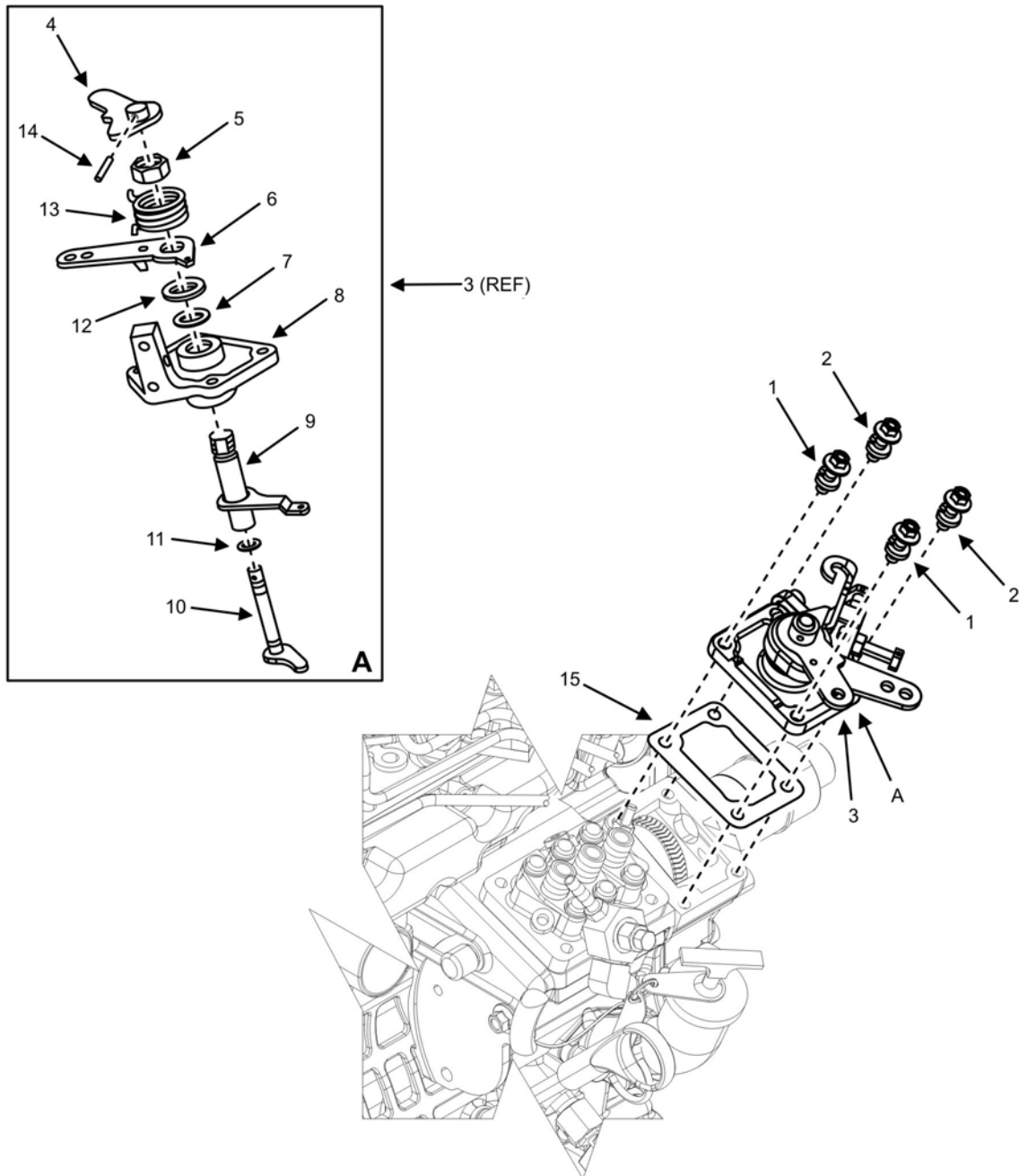


Figure 30. Speed Control Plate (Sheet 1 of 2).

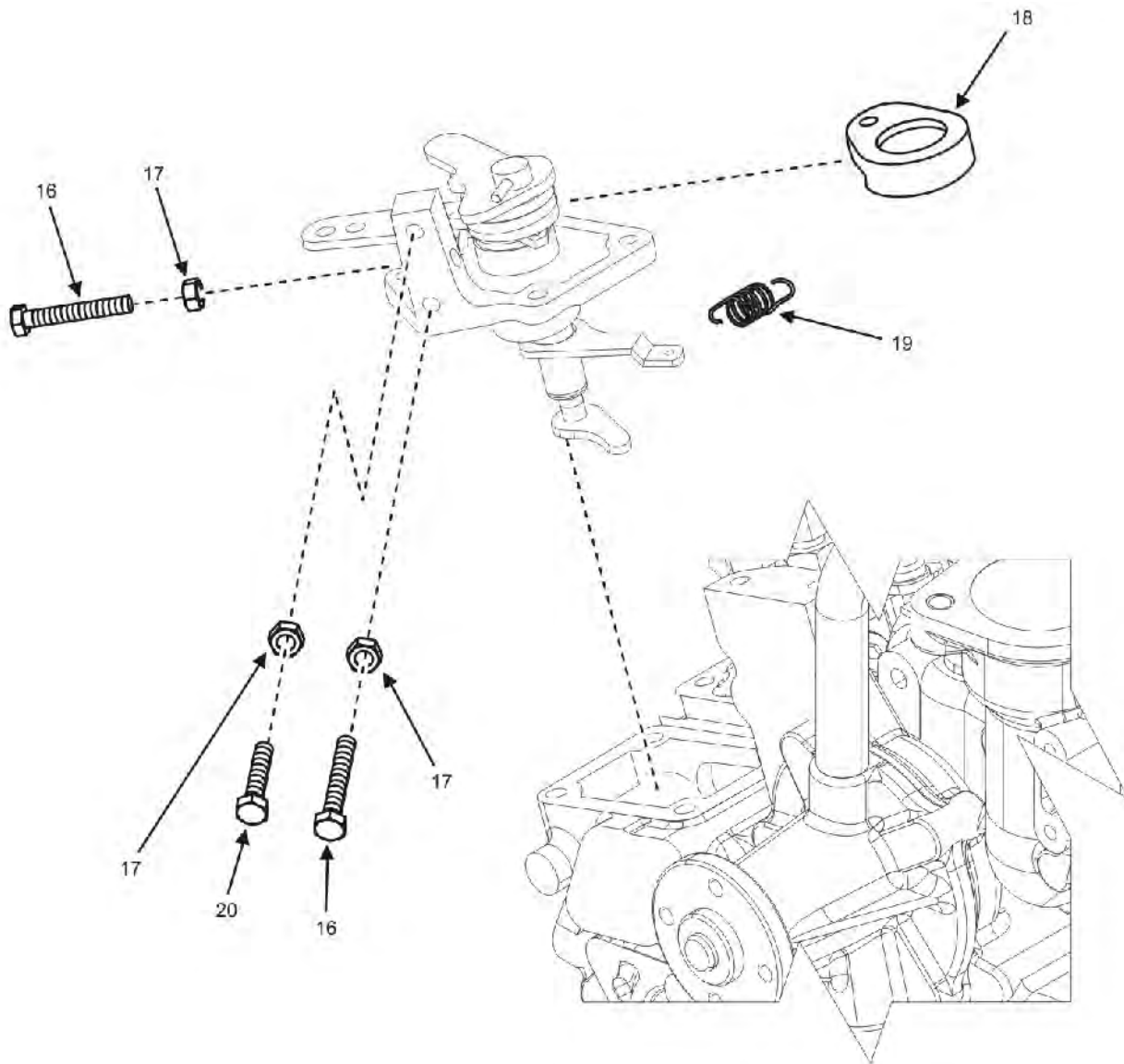


Figure 30. Speed Control Plate (Sheet 2 of 2).

(1)	(2)				(3)	(4)	(5)	(6)	(7)
SMR CODE									
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 090205 SPEED CONTROL PLATE									
FIGURE 30 SPEED CONTROL PLATE									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-507-0141	5X475	01023-50618	. BOLT, MACHINE	2
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-587-8726	0XWR1	16871-9105-0	. BOLT	2
3	PAFFF	PAFFF	PAFFF	PAFFF	2990-01-599-8454	0XWR1	1E142-5700-0	ASSEMBLY SPEED CONTROL PLATE	1
4	XBFZZ	XBFZZ	XBFZZ	XBFZZ		0XWR1	19837-5772-3	. LEVER, ENGINE STOP	1
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-587-8685	0XWR1	16866-9201-0	. NUT, SPEED CONTROL	1
6	XBFZZ	XBFZZ	XBFZZ	XBFZZ		0XWR1	1G639-5715-0	. LEVER, SPEED CONTROL	1
7	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5331-01-537-0010	0XWR1	04814-10160	. O-RING	1
8	PAFZZ	PAFZZ	PAFZZ	PAFZZ	6505-01-585-9923	0XWR1	15841-5711-2	. PLATE, SPEED CONTROL	1
9	XBFZZ	XBFZZ	XBFZZ	XBFZZ		0XWR1	1G820-5611-2	. LEVER, GOVERNOR	1
10	XBFZZ	XBFZZ	XBFZZ	XBFZZ	5331-01-537-0007	0XWR1	1G820-5774-3	. SHAFT, LEVER	1
11	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5331-01-537-0007	0XWR1	04814-10070	. O-RING	1
12	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5365-01-589-5749	0XWR1	19280-5724-0	. COLLAR	1
13	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5360-01-537-2057	0XWR1	16878-5792-0	. SPRING, CONSTANT FORCE	1
14	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5315-01-590-6563	0XWR1	05411-00314	. PIN, SPRING	1
15	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5330-01-478-5161	0XWR1	15841-57212	. GASKET	1
16	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-479-0352	0XWR1	19202-9101-0	. BOLT, MACHINE	2
17	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-320-7038	0XWR1	02056-50060	. NUT, PLAIN HEXAGON	3

Correct PN: 1E212-5700-0
Email rec 4 Mar 20

(1)	(2)				(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE				NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
18	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-587-9944	0XWR1	16866-5730 -2	. CAP	1
19	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5360-01-587-8698	0XWR1	16851-5641 -0	. SPRING, GOVERNOR	1
20	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-479-0365	0XWR1	15108-5728 -00	. BOLT, MACHINE	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 090206 FUEL INJECTION PUMP REPAIR PARTS LIST

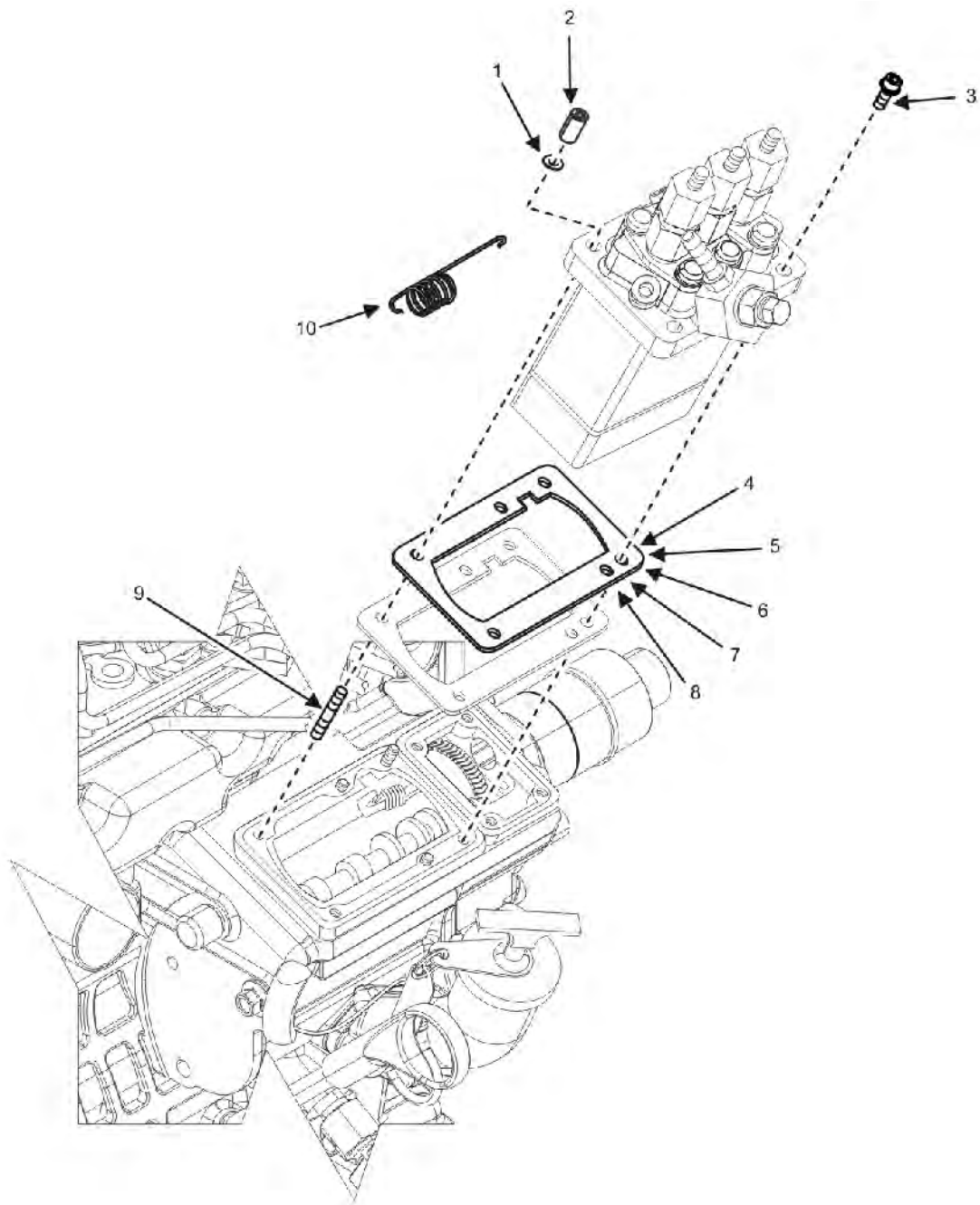


Figure 31. Fuel Injection Pump (Sheet 1 of 2).

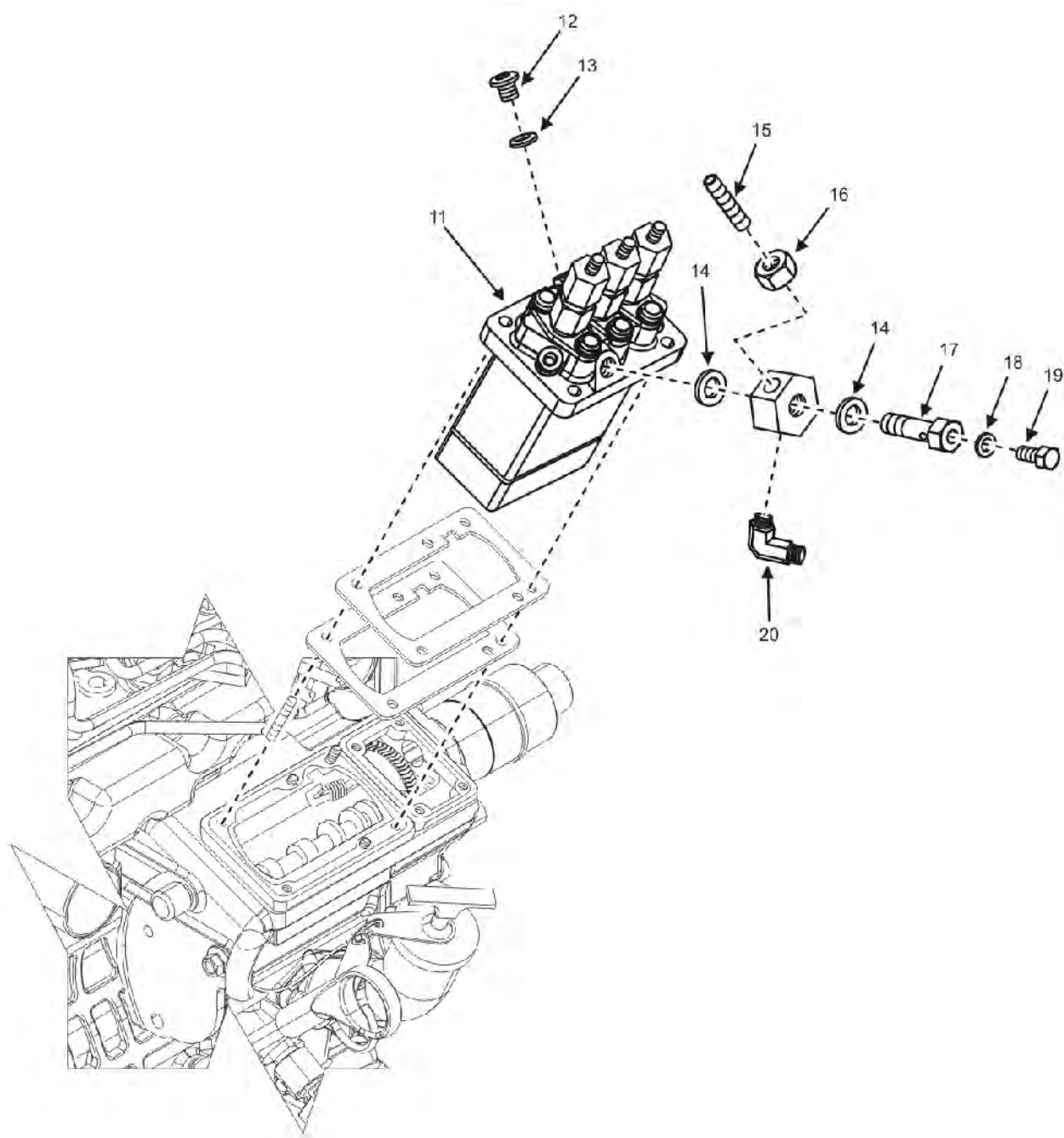
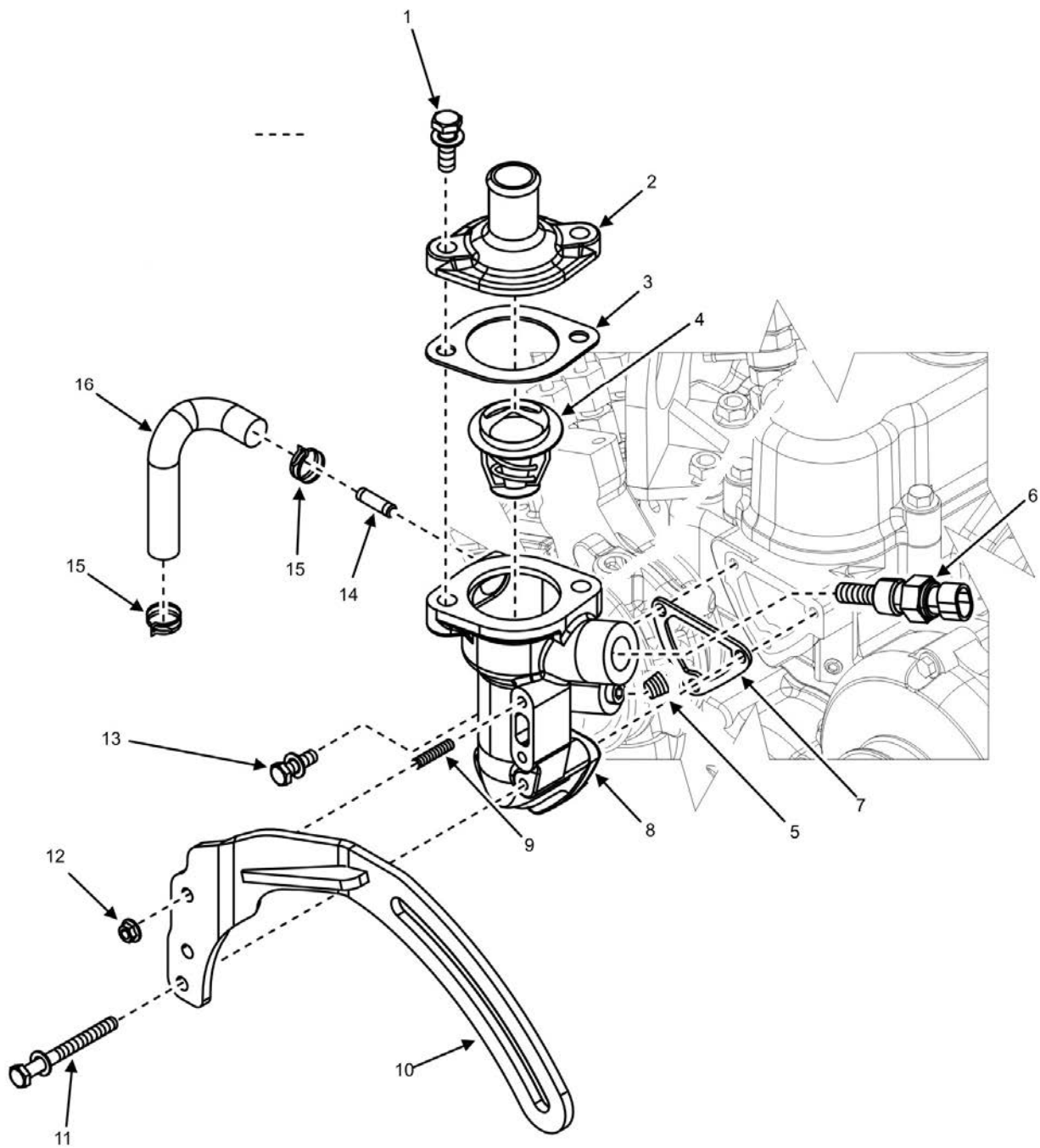


Figure 31. Fuel Injection Pump (Sheet 2 of 2).

(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 090206 FUEL INJECTION PUMP									
FIGURE 31 FUEL INJECTION PUMP									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-320-7100	0XWR1	04512-6006 0	. WASHER	2
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-478-5173	0XWR1	15841-9232 0	. NUT	2
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-587-8754	0XWR1	16871-9106 -0	. BOLT, HEX HEAD SOCKET	2
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5365-01-591-2541	0XWR1	1G700-522 0-0	. SHIM (0.175 MM)	1
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5365-01-437-1065	0XWR1	16006-5209 2	. SHIM (0.200 MM)	1
6	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5365-01-437-1064	0XWR1	16006-5211 2	. SHIM (0.250 MM)	1
7	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5365-01-500-3332	0XWR1	16006-5212 2	. SHIM (0.300 MM)	1
8	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5365-01-589-4782	0XWR1	1G700-521 6-0	. SHIM (0.350 MM)	1
9	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5307-01-477-2256	1Q0C4	15841-9150 0	. STUD	2
10	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5360-01-587-8665	0XWR1	1G820-564 8-2	. SPRING, START	1
11	PAFFF	PAFFF	PAFFF	PAFFF	4320-01-590-8442	0XWR1	1G820-510 1-0	. PUMP ASSEMBLY, FUEL INJECTION ..	1
12	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5365-01-507-2201	5X475	16030-9601 -0	. PLUG	1
13	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5330-01-478-4851	0XWR1	15841-9665 0	. GASKET	2
14	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5330-01-537-0001	0XWR1	15861-9665 -0	. GASKET	1
15	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-017-5119	93061	125HB-3-2	. JOINT	1
16	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-619-6255	30554	04-21771	. FITTING, BANJO	1
17	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-486-3490	S4532	15841-5132 0	. BOLT, FLUID	1
18	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5330-01-478-4849	0XWR1	15841-9666 0	. GASKET	1

(1)	(2)				(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE				NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
19	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-480-1127	0XWR1	15841-5135 0	. SCREW, CAP SOCKET HEAD	1
20	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-593-8323	81343	SAE J514 4- 4 070202C	. ELBOW, MALE ADAPTER	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 090207 THERMOSTAT REPAIR PARTS LIST



(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 090207 THERMOSTAT FIGURE 32 THERMOSTAT									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-500-4271	OXWR1	101123-50825	. BOLT, MACHINE	2
2	XBFZZ	XBFZZ	XBFZZ	XBFZZ		OXWR1	1E051-7326-0	. COVER, THERMOSTAT	1
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5330-01-507-5010	5X475	16221-7327-0	. GASKET	1
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	6685-01-525-5884	OXWR1	19434-7301-4	. THERMOSTAT, FLOW CONTROL	1
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ	3431-01-506-8134	5X475	15841-9602-0	. PLUG	1
6	PAFZZ	PAFZZ	PAFZZ	PAFZZ	6685-01-586-0032	82647	5024-0250	. SENSOR, TEMPERATURE	1
7	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5330-01-586-9080	OXWR1	15841-7292-3	. GASKET	1
8	XBFFF	XBFFF	XBFFF	XBFFF		OXWR1	11E212-7270-0	. HOUSING, THERMOSTAT	1
9	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5307-01-587-8555	30554	04-20950	. STUD	2
10	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20860	. BRACKET, MOUNTING	1
11	PFFZZ	PFFZZ	PFFZZ	PFFZZ	5306-01-500-8701	OXWR1	101023-60650	. BOLT, MACHINE	1
12	PAFFF	PAFFF	PAFFF	PAFFF	5310-33-208-2057	D8286	DIN6923-M6	. NUT, PLAIN EXTENDED	2
13	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-506-9038	5X475	01023-50616	. BOLT, MACHINE	2
14	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4710-01-507-4421	5X475	16241-7337-0	. PIPE, METALLIC	1
15	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-478-7130	OXWR1	16241-73360	. CLAMP, HOSE	2
16	PCFZZ	PCFZZ	PCFZZ	PCFZZ	4720-01-642-3285	OXWR1	1E132-7335-0	. HOSE, NON-METALLIC	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 090208 WATER PUMP REPAIR PARTS LIST

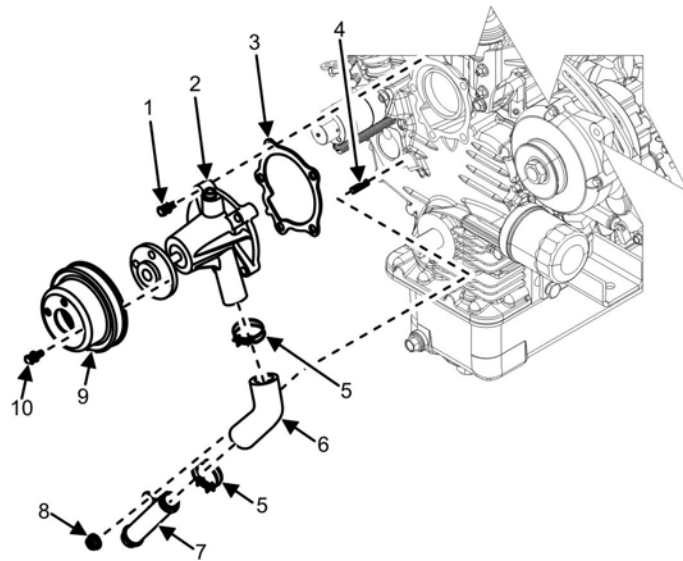


Figure 33. Water Pump.

(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 090208 WATER PUMP FIGURE 33 WATER PUMP									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-321-3372	S4532	01023-5062 2	. BOLT, MACHINE	5
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2930-01-597-6224	0XWR1	1G820-730 3-0	. PUMP, WATER	1
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5330-01-587-8688	0XWR1	16851-7343 -0	. GASKET	1
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5307-01-496-6030	S4532	15841-9151 -0	. STUD, PLAIN	1
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-496-6572	S4532	15841-7296 -0	. CLAMP, HOSE	2
6	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4720-01-496-6578	S4532	15841-7287 -0	. PIPE, WATER	1
7	PCFZZ	PCFZZ	PCFZZ	PCFZZ	2930-98-205-9103	S4532	15841-7286 -0	. HOSE, PREFORMED	1
8	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-500-2374	0XWR1	02751-5006 0	. NUT, PLAIN PLATED	1
9	PAFZZ	PAFZZ	PAFZZ	PAFZZ	3020-01-537-0881	0XWR1	15841-7425 -0	. PULLEY, FAN	1
10	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2990-99-917-5958	S8029	01754-5061 0	. BOLT, FLANGE	4
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE

GROUP 090209 BATTERY-CHARGING ALTERNATOR AND BELT REPAIR PARTS LIST

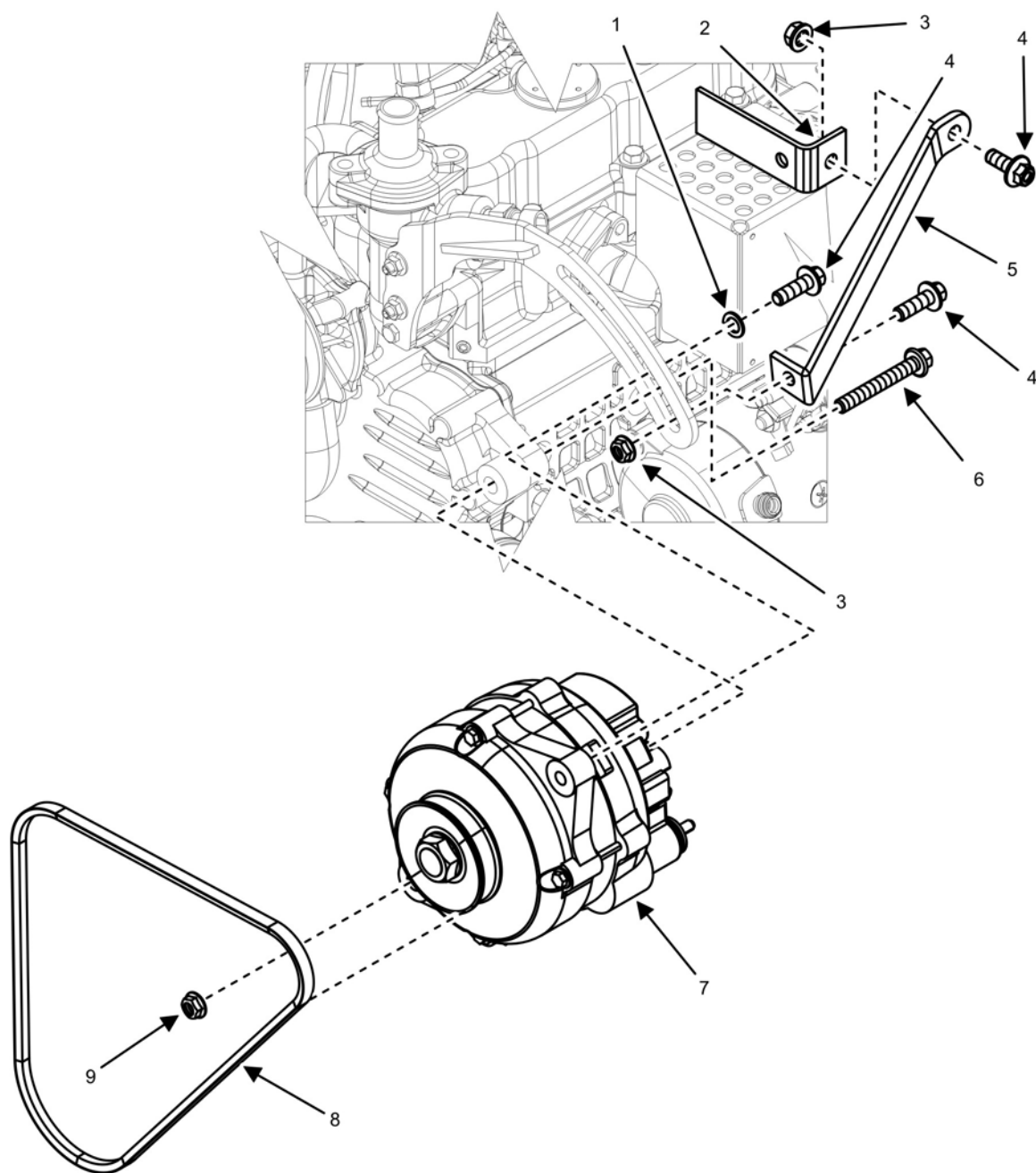


Figure 34. Battery-Charging Alternator and Belt.

(1)	(2)				(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE				NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
GROUP 090209 BATTERY-CHARGING ALTERNATOR AND BELT FIGURE 34 BATTERY-CHARGING ALTERNATOR AND BELT									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-12-124-0184	D8286	DIN126-9-1 00HV	. WASHER, FLAT (M8)	1
2	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21684	BRACE, REAR	1
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-12-318-9539	D8286	DIN 6923-M 8X1.25	. NUT, HEX FLANGE (M8X1.25)	2
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-596-3693	05047	AES10M08B 025WB4K42	. SCREW, HEX FLANGE (M8X1.25X25) .	3
5	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21683	. BRACKET, ALTERNATOR	1
6	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-603-1160	05047	AES10M08B 060CH1K42	. SCREW, CAP HEX FLANGE (M8X1.25X60)	1
7	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2920-01-589-0612	47KE9	A002TA907 1	. ALTERNATOR, BATTERY-CHARGING	1
8	PCFZZ	PCFZZ	PCFZZ	PCFZZ	3030-01-588-0982	30554	04-20042	. BELT, V	1
9	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-598-7748	05047	AEN18M08B 000BB1K42	. NUT, HEX FLANGE (M8X1.25)	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 090210 STARTER REPAIR PARTS LIST

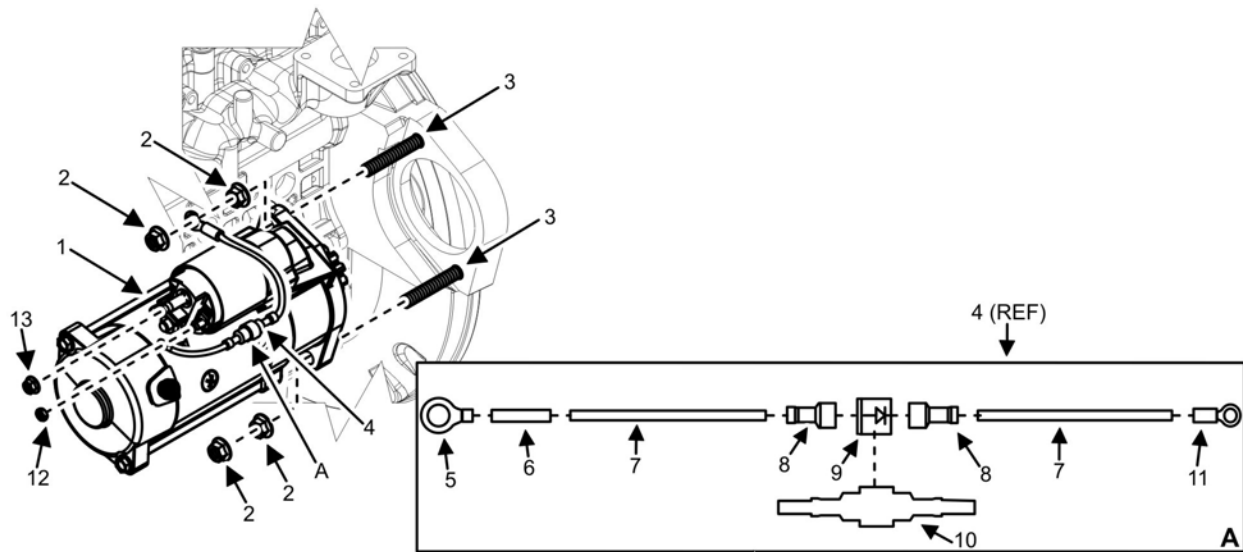


Figure 35. Starter.

(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 090210 STARTER									
FIGURE 35 STARTER									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	6110-01-595-8949	10360	11.131.45.7	. MOTOR, STARTER, 24 VOLT	1
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ		30554	DIN6923-M 10	. NUT, HEX FLANGE (M10X1.5)	4
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5307-01-597-3973	30554	04-20771	. STUD (M10 X 1.5 X 65)	2
4	PAFFF	PAFFF	PAFFF	PAFFF	6150-01-586-0281	30554	04-21425	. LEAD, ELECTRICAL	1
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-01-586-0272	00779	2-36160-1	. . TERMINAL, LUG	1
6	XBFZZ	XBFZZ	XBFZZ	XBFZZ		53421	04-20556	. . LAMINATE, LABEL COVER	1
7	MFFZZ	MFFZZ	MFFZZ	MFFZZ		44940	04-20448	. . STRAND, WIRE,(MAKE FROM P/N 3271-16-26 ON BULK ITEMS LIST, CUT TO LENGTH AS NEEDED)	1
8	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-01-586-0213	30554	88-20275-3	. . TERMINAL, DISCONNECT	2
9	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5961-01-586-0276	30554		. . SEMICONDUCTOR DEVICE	1
10	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	88-20541-15	. . SLEEVING, INSULATING, (MAKE FROM 88-20541-15 ON BULK ITEMS LIST CUT TO LENGTH 25 MM BEYOND CRIMPED ENDS)	1
11	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-01-585-9905	00779	04-21412	. . TERMINAL, LUG	1
12	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-168-8140	IFH08	DIN943M5	. NUT, HEX (M5X0.8)	1
13	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-598-0222	05047	AEN18M08B 000BA7H91	. NUT, HEX FLANGE (M8X1.25)	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 090211 GOVERNOR ACTUATOR REPAIR PARTS LIST

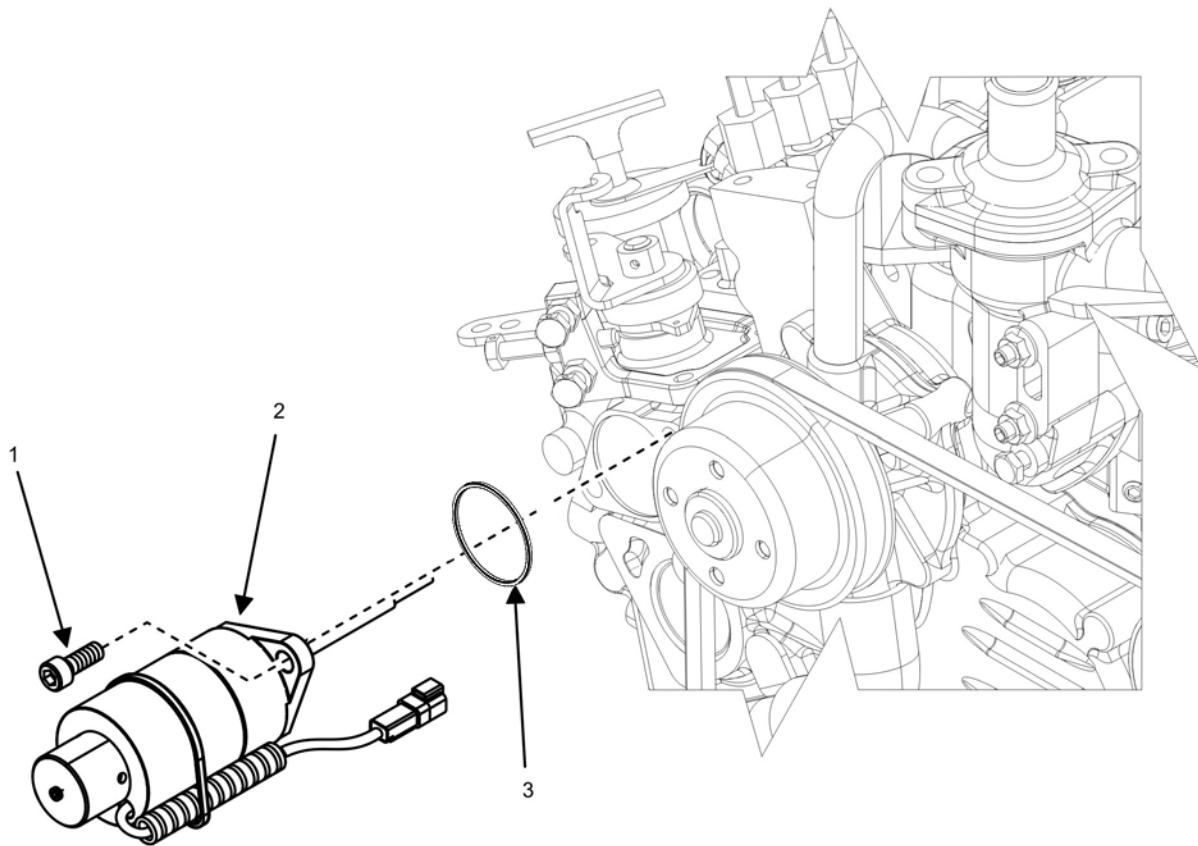


Figure 36. Governor Actuator.

(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.					
ITEM	AIR					PART		DESCRIPTION AND	
NO.	ARMY	FORCE	NAVY	USMC	NSN	CAGEC	NUMBER	USABLE ON CODE (UOC)	QTY
GROUP 090211 GOVERNOR ACTUA-TOR									
FIGURE 36 GOVERNOR ACTUATOR									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-12-181-5223	D8286	DIN912-M6X 16-12.9-A2P	. SCREW, CAP SOCKET HEAD (M6X1X16)	2
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2990-01-599-8433	5DR61	9269	. GOVERNOR ACTUATOR	1
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5331-01-593-5319	60363	53839S	. GASKET, ACTUATOR	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 090212 INTAKE MANIFOLD REPAIR PARTS LIST

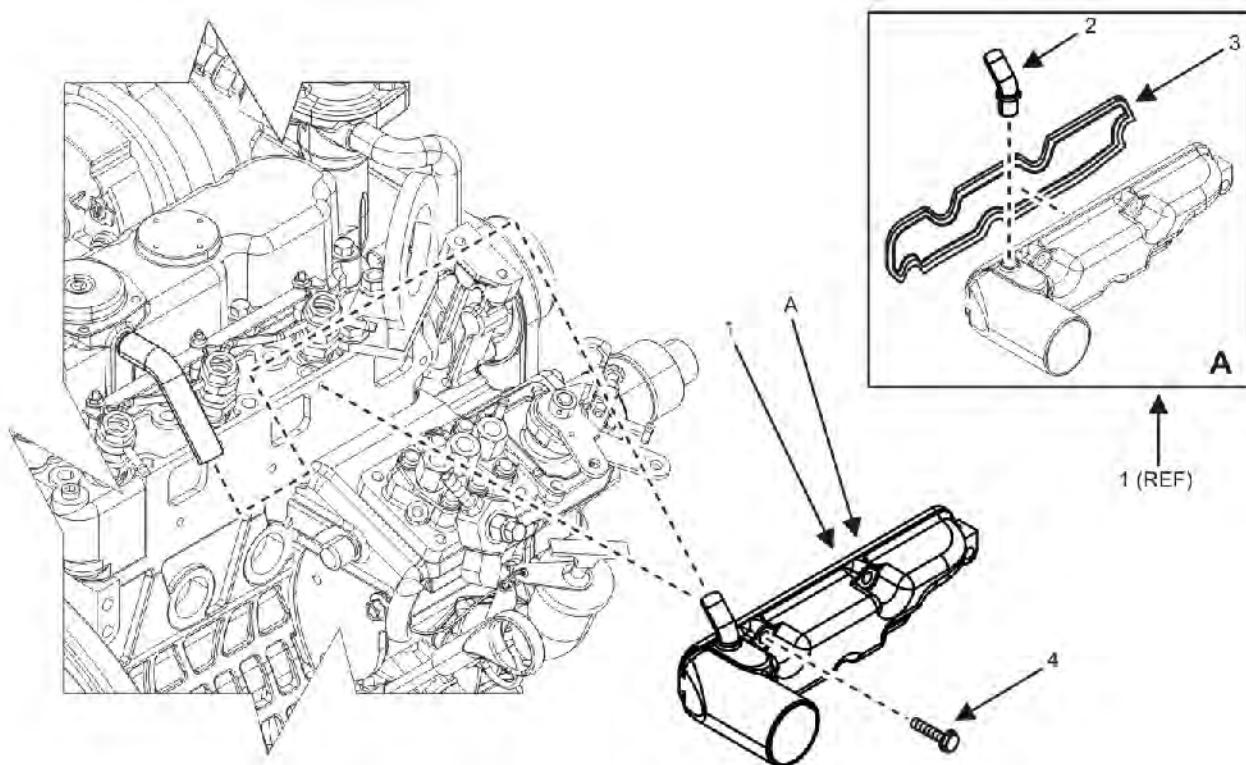


Figure 37. Intake Manifold.

(1)	(2)				(3)	(4)	(5)	(6)	(7)
SMR CODE									
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 090212 INTAKE MANIFOLD									
FIGURE 37 INTAKE MANIFOLD									
1	XBFFF	XBFFF	XBFFF	XBFFF		0XWR1	1G960-117 7-0	. ASSEMBLY, INTAKE MANIFOLD	1
2	PCFZZ	PCFZZ	PCFZZ	PCFZZ	4710-01-586-9233	0XWR1	1G960-055 5-0	. . PIPE, BREATHER	1
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5330-01-587-8670	0XWR1	1G962-118 2-0	. . GASKET, INTAKE MANIFOLD	1
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-14-514-1570	0XWR1	01023-5062 5	. BOLT	5
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 090213 EXHAUST MANIFOLD REPAIR PARTS LIST

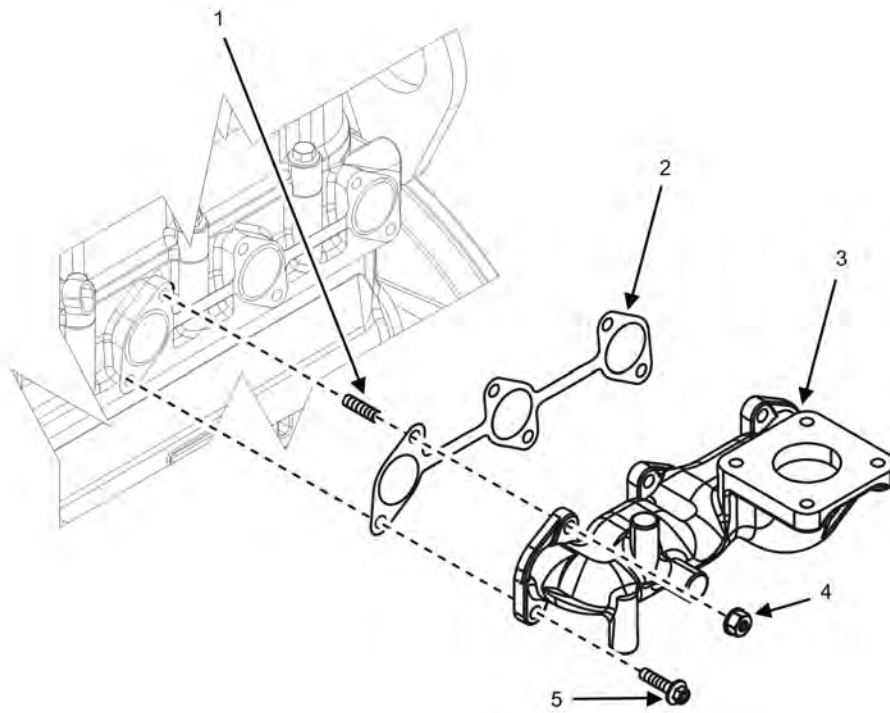


Figure 38. Exhaust Manifold.

(1)	(2)				(3)	(4)	(5)	(6)	(7)
SMR CODE									
a.	b.	c.	d.						
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 090213 EXHAUST MANIFOLD									
FIGURE 38 EXHAUST MANIFOLD									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5307-01-496-6035	S4532	01513-50618	. STUD	3
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5330-01-587-8541	0XWR1	1G962-1235-0	. GASKET, EXHAUST MANIFOLD	1
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2815-01-587-4306	0XWR1	1E121-1231-0	. MANIFOLD, EXHAUST	1
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-478-5187	0XWR1	02756-50060	. NUT, UBS	3
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-496-6045	S4532	01759-50616	. BOLT, UBS	3
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 090214 OIL PAN AND STRAINER REPAIR PARTS LIST

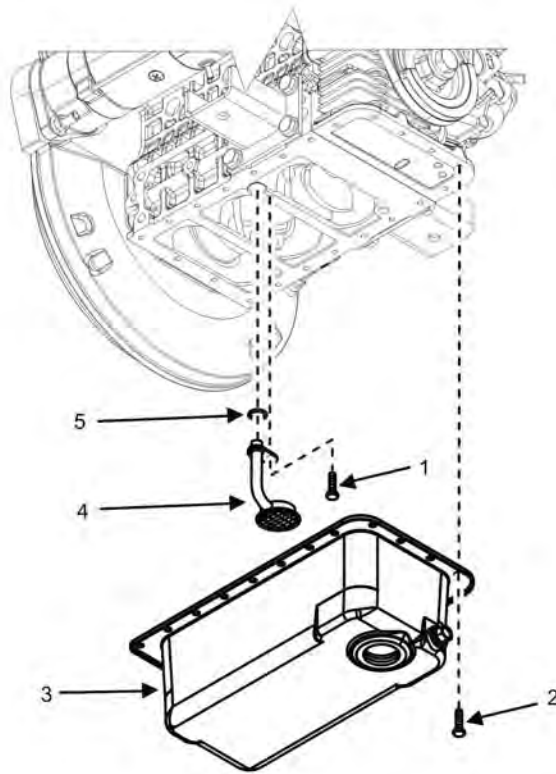


Figure 39. Oil Pan and Strainer.

(1)		(2)	(3)	(4)	(5)	(6)	(7)
		SMR CODE					
	a.	b.	c.	d.			
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER
							DESCRIPTION AND USABLE ON CODE (UOC)
							QTY
GROUP 090214 OIL PAN AND STRAINER							
FIGURE 39 OIL PAN AND STRAINER							
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-500-4262	0ZWR1	01123-6081 . BOLT 1
						4	
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-320-7024	S4532	01023-5061 . BOLT 22
						4	
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2815-01-587-5954	0ZWR1	1G962-015 . PAN, OIL 1
						0-2	
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2940-01-587-6850	0ZWR1	16851-3211 . STRAINER 1
						-0	
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ	3430-01-506-5021	5X475	04814-0016 . O-RING 1
						0	
END OF FIGURE							

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 090215 FLYWHEEL REPAIR PARTS LIST

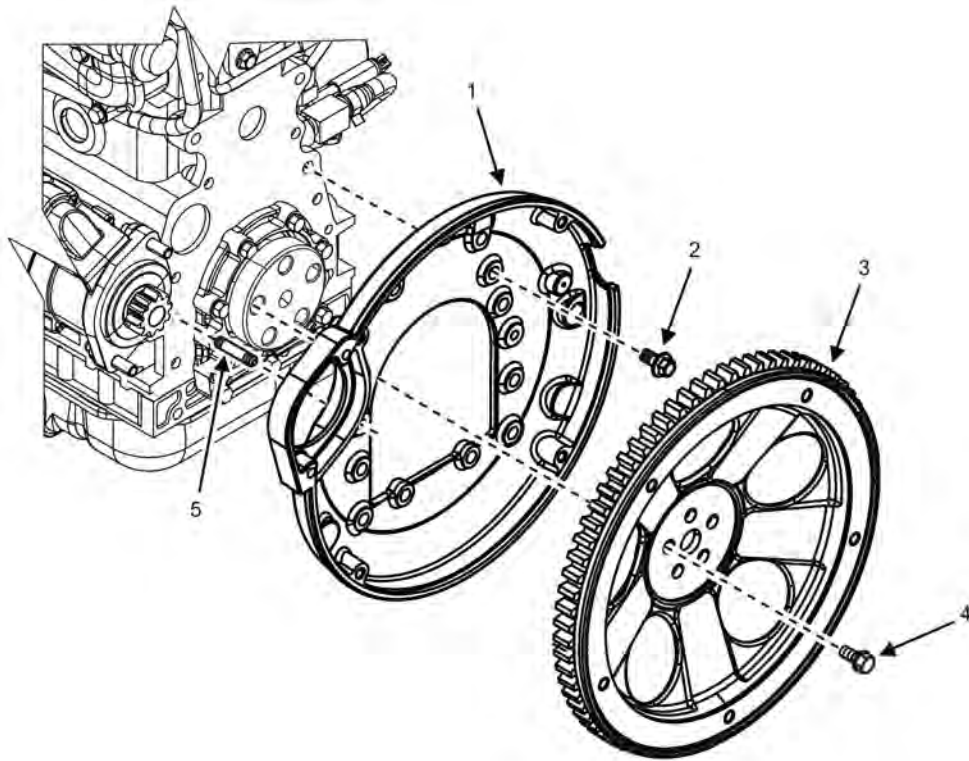


Figure 40. Flywheel.

(1)	(2)				(3)	(4)	(5)	(6)	(7)
SMR CODE									
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 090215 FLYWHEEL									
FIGURE 40 FLYWHEEL									
1	XBZZ	XBZZ	XBZZ	XBZZ		30554	04-20153	. ADAPTER, ALTERNATOR, MACHINED	1
2	PAZZ	PAZZ	PAZZ	PAZZ	5305-01-596-3693	05047	AES10M08B 025WB4K42	. SCREW, HEX FLANGE HEAD (M8X1.25X25)	9
3	PAZZ	PAZZ	PAZZ	PAZZ	2815-01-595-7312	30554	04-20141	. FLYWHEEL	1
4	PAZZ	PAZZ	PAZZ	PAZZ	5305-01-596-3651	05047	AES10M06A 016WB4K42	. SCREW, HEX HEAD (M10X1.25X20) ...	5
5	PAZZ	PAZZ	PAZZ	PAZZ	5315-12-135-9147	D8286	DIN1481-M 3X40	. PIN, SPRING	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE

GROUP 090216 CRANKCASE REAR BEARING CASE COVER REPAIR PARTS LIST

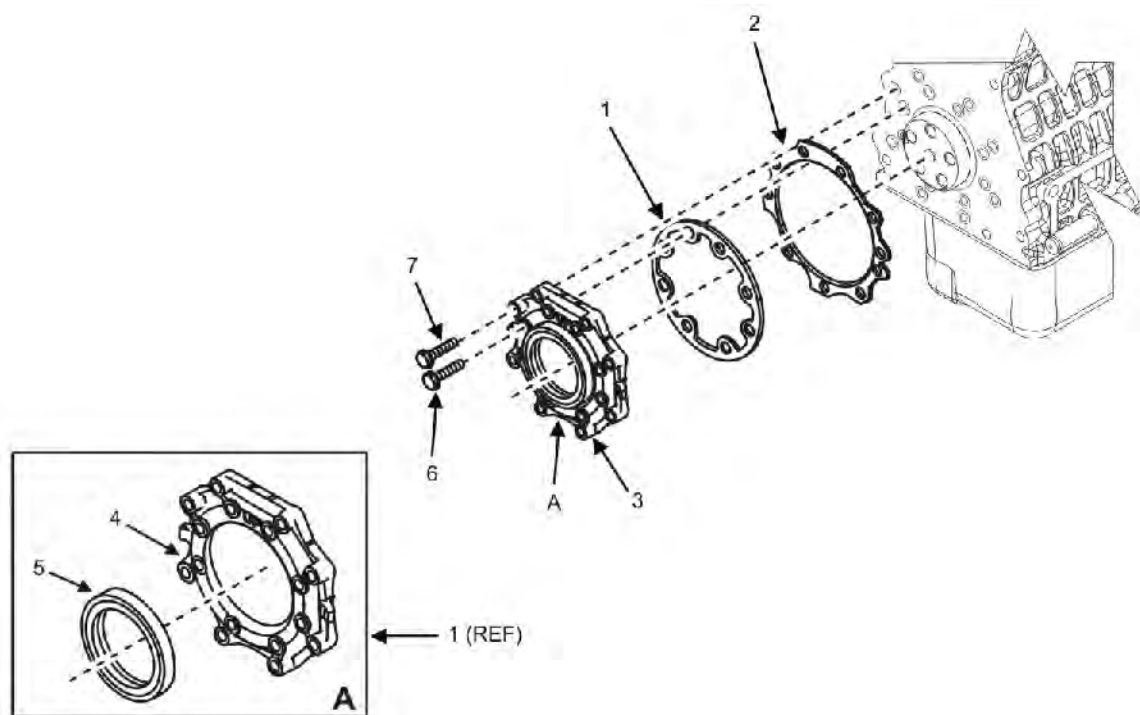


Figure 41. Crankcase Rear Bearing Case Cover.

(1)	(2)				(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE				NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
GROUP 090216 CRANKCASE REAR BEARING CASE COVER FIGURE 41 CRANKCASE REAR BEARING CASE COVER									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5330-01-586-9086	0XWR1	1G960-043 6-0	. GASKET, BEARING CASE	1
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5330-01-587-8678	0XWR1	15841-0482 -3	. GASKET, CASE COVER	1
3	XBFHH	XBFHH	XBFZZ	XBFZZ		0XWR1	15841-0480 -3	. COVER ASSEMBLY, BEARING CASE .	1
4	XBFHH	XBFHH	XBFZZ	XBFZZ		0XWR1	15841-0481 -5	. . COVER, BEARING CASE	1
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5330-01-478-6004	0XWR1	19215-9916 -0	. . SEAL, OIL	1
6	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-321-3375	S4532	01023-5062 0	. BOLT	8
7	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-321-3372	S4532	01023-5062 2	. BOLT	8
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 090217 CYLINDER HEAD ASSEMBLY REPAIR PARTS LIST

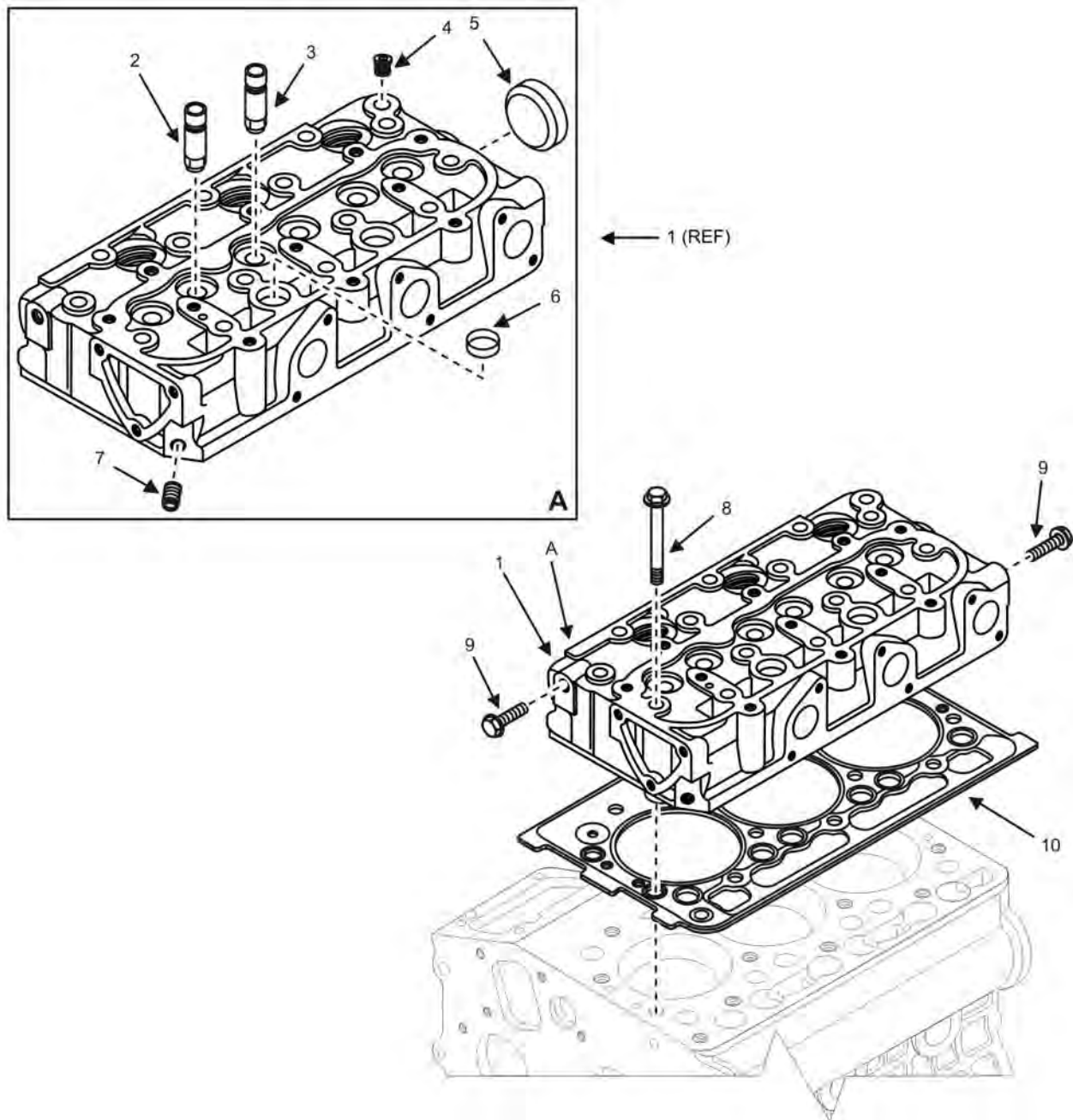


Figure 42. Cylinder Head Assembly.

(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 090217 CYLINDER HEAD ASSEMBLY FIGURE 42 CYLINDER HEAD ASSEMBLY									
1	PAFHH	PAFHH	PAFFF	PAFFF	4310-01-590-8438	0XWR1	1G962-030 4-5	. ASSEMBLY, CYLINDER HEAD	1
2	PAHZZ	PAHZZ	PAFZZ	PAFZZ	4820-01-597-6225	52AH2	15841-1354 -0	. . GUIDE, INLET VALVE	3
3	PAHZZ	PAHZZ	PAFZZ	PAFZZ	4820-01-597-6226	52AH2	15841-1356 -0	. . GUIDE, EXHAUST VALVE	3
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	3431-01-506-8134	5X475	15841-9602 -0	. . PLUG	1
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ	3431-01-506-8102	5X475	15321-9626 -0	. . CAP, SEALING	1
6	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-533-3731	1Q0C4	15261-0337 -0	. . CAP, SEALING	2
7	PAHZZ	PAHZZ	PAFZZ	PAFZZ	5365-01-506-4655	5X475	15261-9601 -0	. . PLUG	1
8	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-536-8998	0XWR1	14601-0345 -0	. BOLT, CYLINDER HEAD	14
9	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-500-4266	0XWR1	01123-6081 6	. BOLT	2
10	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5330-01-588-0723	0XWR1	1G962-033 1-3	. GASKET, CYLINDER HEAD	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 09021701 VALVE COVER REPAIR PARTS LIST

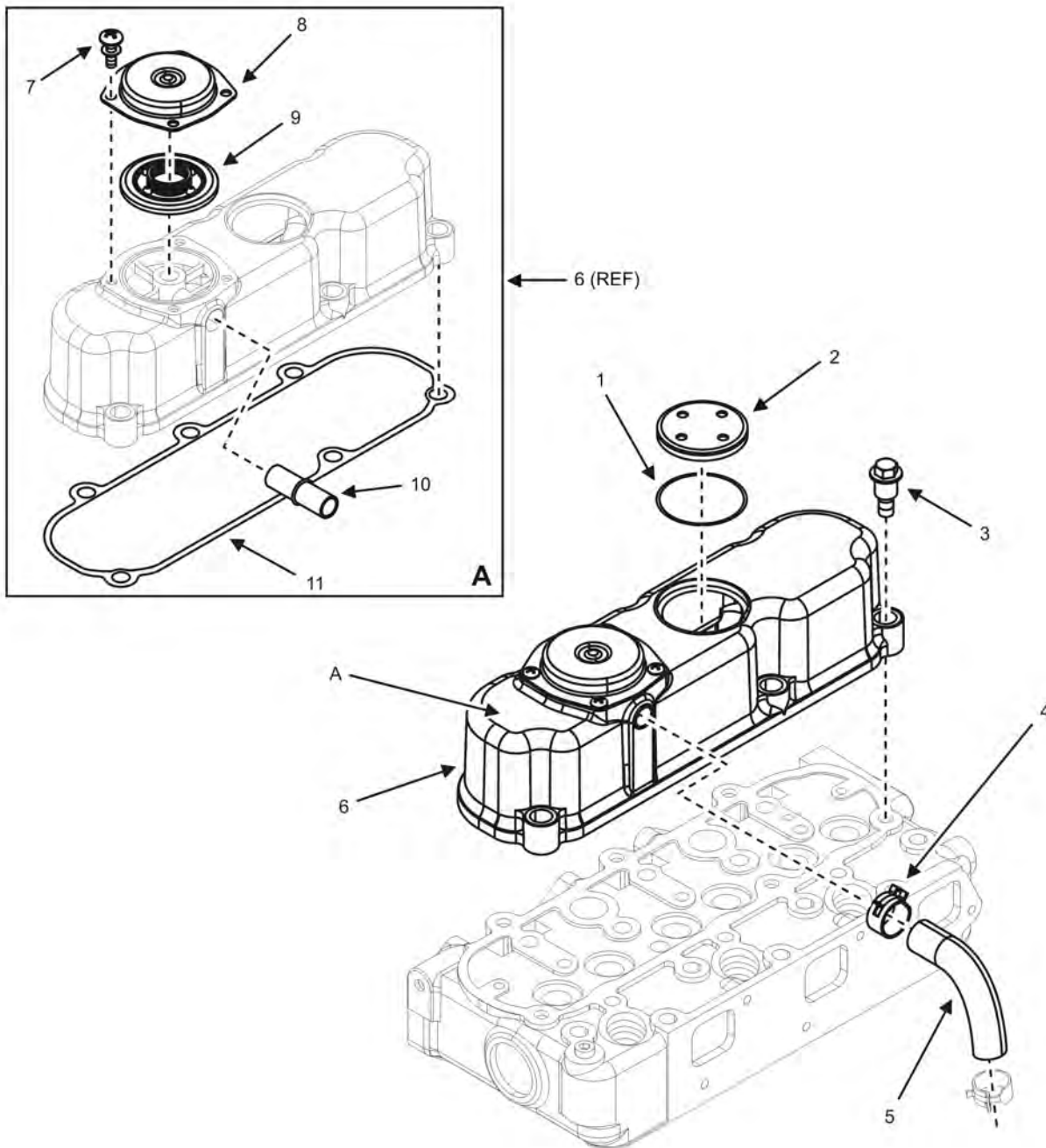


Figure 43. Valve Cover.

(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.			PART	DESCRIPTION AND	
ITEM	AIR						NUMBER	USABLE ON CODE (UOC)	QTY
NO.	ARMY	FORCE	NAVY	USMC	NSN	CAGEC			
GROUP 09021701 VALVE COVER									
FIGURE 43 VALVE COVER									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	3431-01-506-8286	5X475	04814-5030 0	. O-RING	1
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5365-01-542-6383	5X475	E9151-331 40	. PLUG, OIL FILLER	1
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-590-5676	K5F98	1G911-910 2-2	. BOLT	4
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-597-6538	52AH2	09318-8812 5	. CLAMP, HOSE	2
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2815-01-597-6531	52AH2	1G960-055 1-2	. TUBE,BREATHER	1
6	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-589-5756	0XWR1	1G960-145 0-5	. ASSEMBLY, VALVE COVER	1
7	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-479-0358	0XWR1	03024-5051 0	. . SCREW WITH WASHER	4
8	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-542-6396	5X475	1G801-051 20	. . COVER, BREATHER	1
9	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2815-01-542-6394	5X475	1G801-052 0-3	. . VALVE, BREATHER	1
10	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4710-01-507-4421	5X475	16241-7337 -0	. . PIPE, WATER RETURN	1
11	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5330-01-588-0728	0XWR1	1G962-145 2-2	. . GASKET, VALVE COVER	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 09021702 ENGINE VALVES REPAIR PARTS LIST

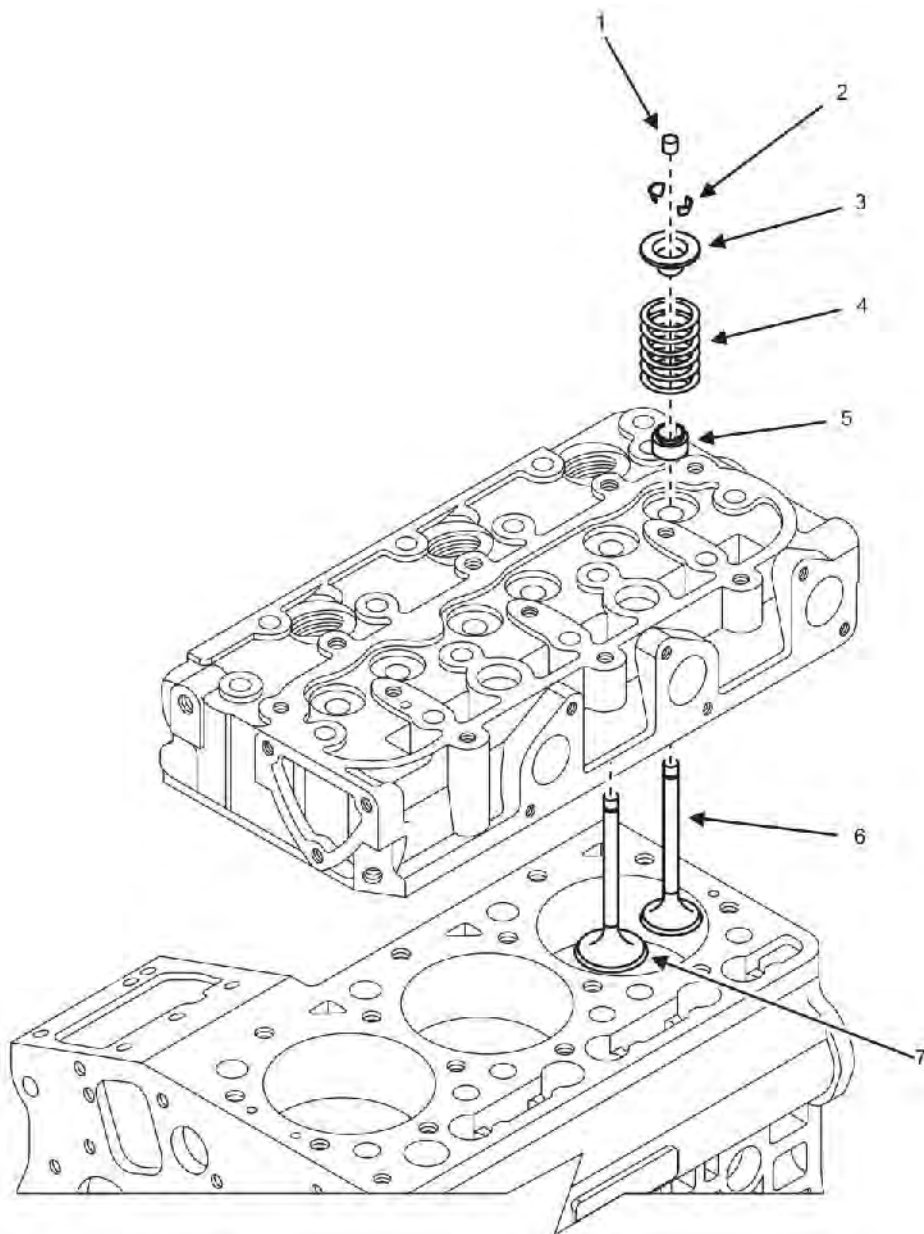


Figure 44. Engine Valves.

(1)	(2)				(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE				NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
GROUP 09021702 ENGINE VALVES FIGURE 44 ENGINE VALVES									
1	PAHZZ	PAHZZ	PAFZZ	PAFZZ	2815-01-500-6972	0XWR1	16851-1328 0	. CAP, VALVE	6
2	PAHZZ	PAHZZ	PAFZZ	PAFZZ	2815-99-610-4361	S8029	14601-1336 -0	. COLLET, VALVE SPRING	6
3	PAHZZ	PAHZZ	PAFZZ	PAFZZ	5340-99-235-4309	S8029	14601-1333 -0	. RETAINER, SPRING	6
4	PAHZZ	PAHZZ	PAFZZ	PAFZZ	5360-99-911-5629	S8029	14601-1324 -0	. SPRING, VALVE	6
5	PAHZZ	PAHZZ	PAFZZ	PAFZZ	5330-01-478-6002	0XWR1	11420-1315 0	. SEAL, VALVE STEM	6
6	PAHZZ	PAHZZ	PAFZZ	PAFZZ	2815-01-597-6229	52AH2	1G687-131 2-0	. VALVE, EXHAUST	3
7	PAHZZ	PAHZZ	PAFZZ	PAFZZ	2815-01-597-6228	52AH2	1G687-131 1-0	. VALVE, INLET	3
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE

GROUP 09021703 ROCKER ARMS AND PUSH RODS REPAIR PARTS LIST

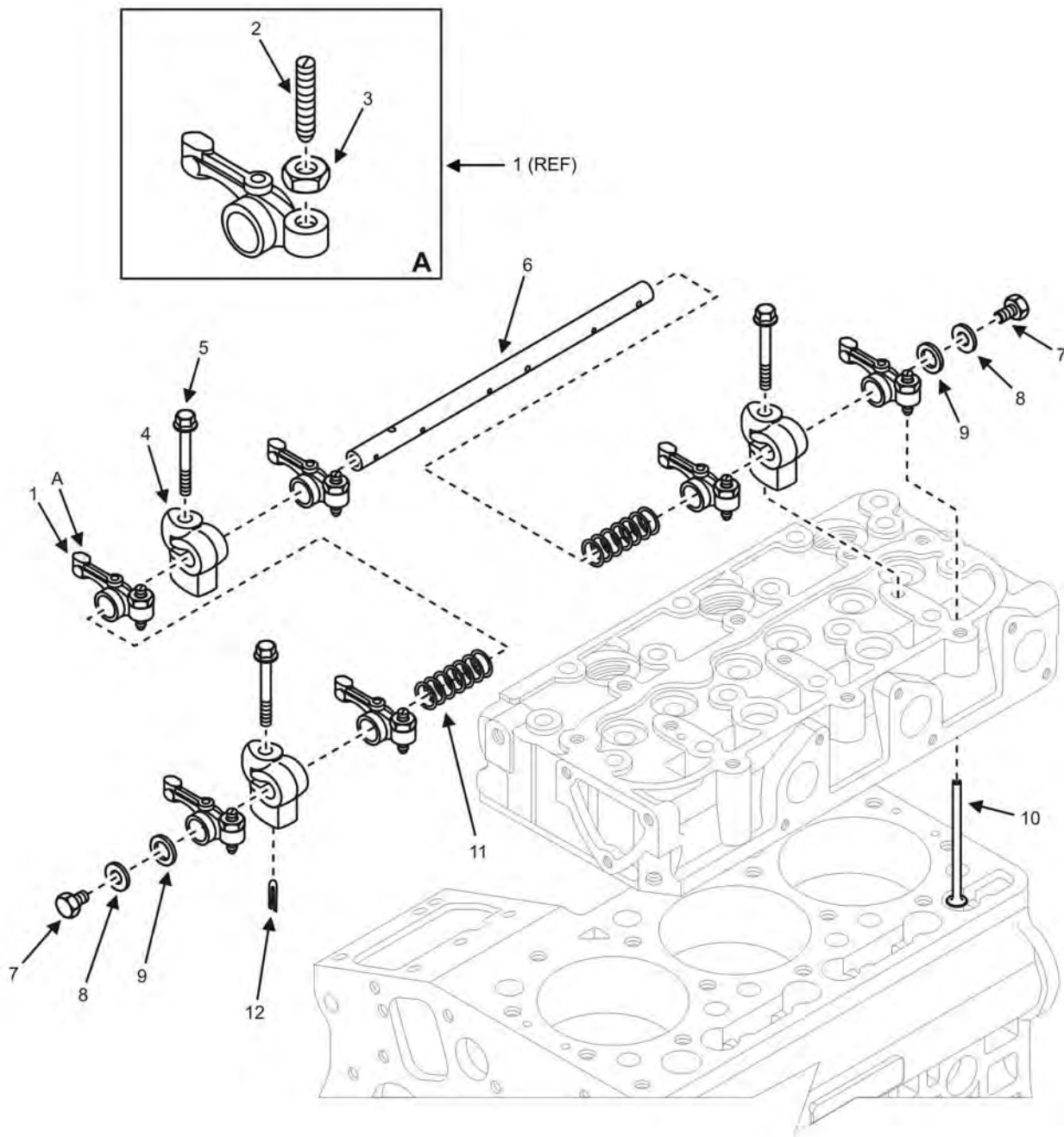


Figure 45. Rocker Arms and Push Rods.

(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 09021703 ROCKER ARMS AND PUSH RODS									
FIGURE 45 ROCKER ARMS AND PUSH RODS									
1	PAFFF	PAFFF	PAFFF	PAFFF	2815-01-478-7538	0XWR1	15841-1403-0	. ASSEMBLY, ROCKER ARM	6
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-537-1683	0XWR1	15841-1423-0	. . SCREW, ADJUSTING	6
3	XBFZZ	XBFZZ	XBFZZ	XBFZZ		0XWR1	14601-1424-0	. . NUT	6
4	XBFZZ	XBFZZ	XBFZZ	XBFZZ		0XWR1	1G460-1435-0	. BRACKET, ROCKER ARM	3
5	PAHZZ	PAHZZ	PAHZZ	PAHZZ	5306-22-127-1431	0XWR1	01754-50640	. BOLT, FLANGE	3
6	PAHZZ	PAHZZ	PAHZZ	PAHZZ	2895-01-587-6016	0XWR1	1G962-1426-2	. SHAFT, ROCKER ARM	1
7	PAHZZ	PAHZZ	PAFZZ	PAFZZ	5306-01-393-4861	31013	01023-50610	. BOLT	2
8	PAHZZ	PAHZZ	PAFZZ	PAFZZ		0XWR1	15842-9402-2	. WASHER, PLAIN	2
9	PAHZZ	PAHZZ	PAFZZ	PAFZZ	5365-01-500-3268	0XWR1	16871-1443-0	. WASHER	2
10	PAHZZ	PAHZZ	PAFZZ	PAFZZ	2815-01-478-7489	0XWR1	16851-1511-0	. PUSH ROD	6
11	PHHZZ	PHHZZ	PHHZZ	PHHZZ	5340-01-588-0263	0XWR1	1G460-1431-2	. SPRING, ROCKER ARM	2
12	PAHZZ	PAHZZ	PAFZZ	PAFZZ	5315-01-500-0653	0XWR1	05411-00420	. PIN, SPRING	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 090218 SHORT BLOCK ASSEMBLY REPAIR PARTS LIST

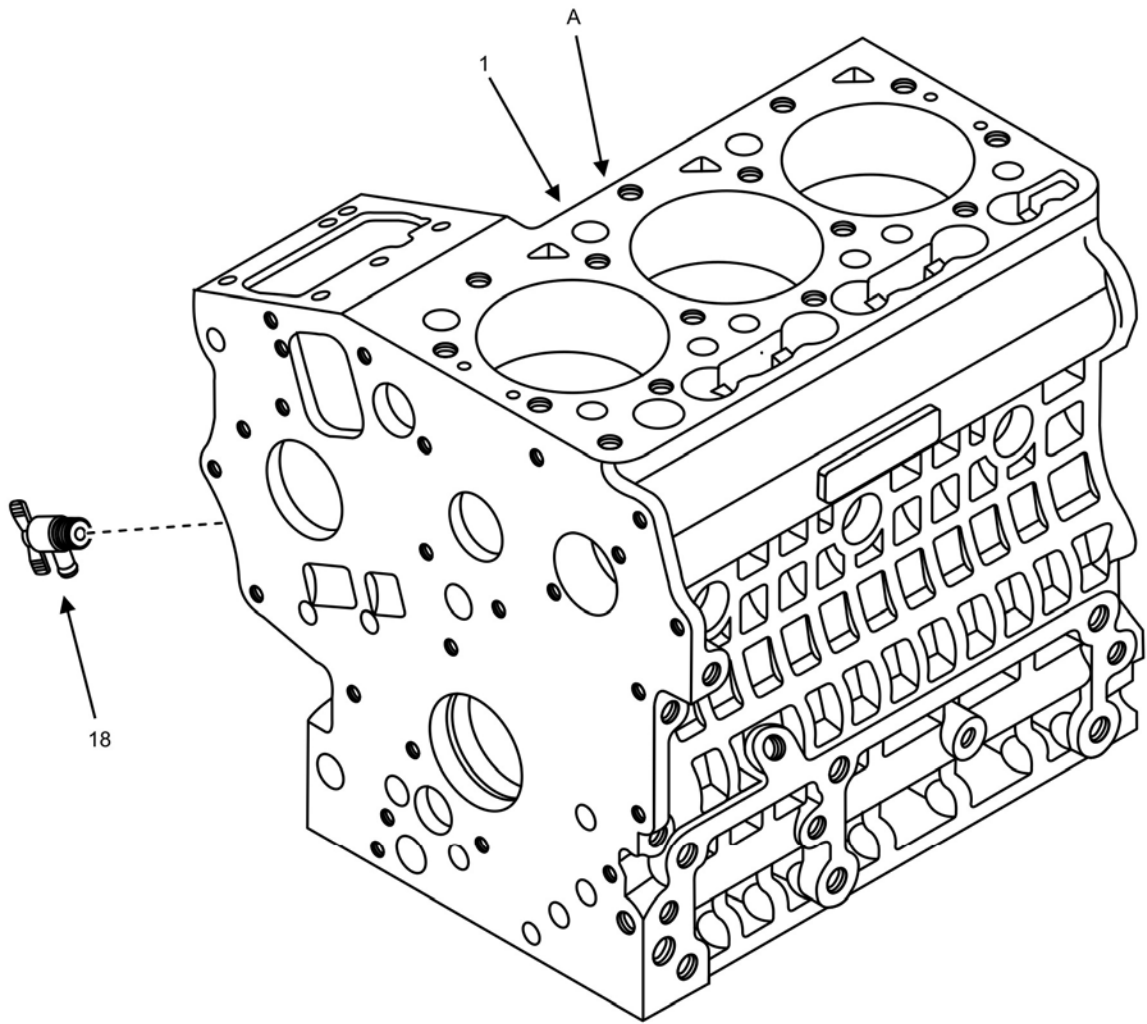


Figure 46. Short Block Assembly (Sheet 1 of 2).

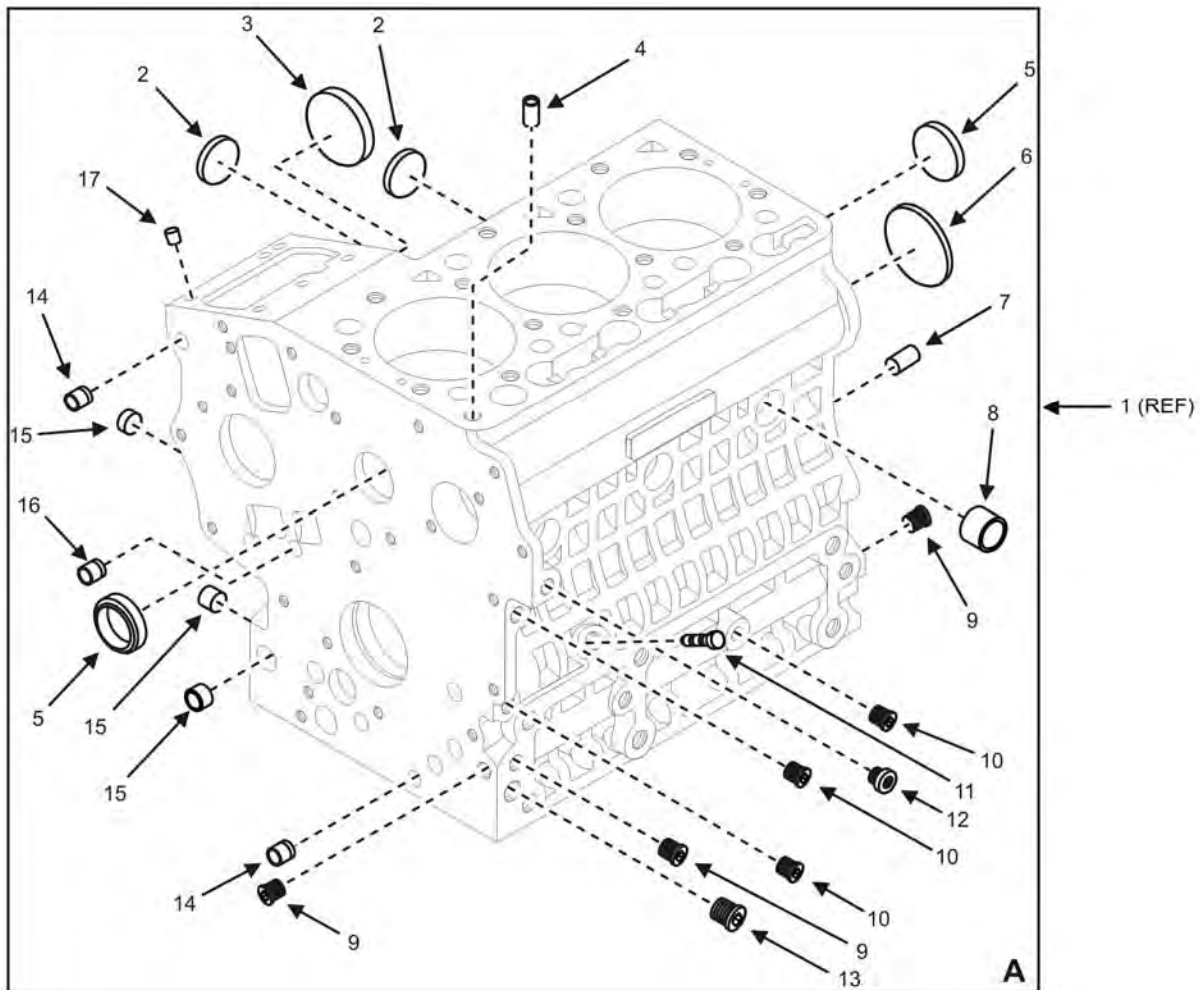


Figure 46. Short Block Assembly (Sheet 2 of 2).

(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 090218 SHORT BLOCK ASSEMBLY FIGURE 46 SHORT BLOCK ASSEMBLY									
1	PAHHH	PAHHH	PAFFF	PAFFF	2815-01-587-9098	0XWR1	1G952-010 1-9	. SHORT BLOCK ASSEMBLY	1
2	PAHZZ	PAHZZ	PAFZZ	PAFZZ	4730-01-597-6227	52AH2	06311-8502 5	. . CAP, SEALING	2
3	PAHZZ	PAHZZ	PAFZZ	PAFZZ	2815-01-537-1201	0XWR1	16851-1621 -2	. . COVER, FUEL CAMSHAFT	1
4	PAHZZ	PAHZZ	PAFZZ	PAFZZ	5315-01-596-4497	1Q0C4	15221-3365 -0	. . PIN, PIPE	1
5	PAHZZ	PAHZZ	PAFZZ	PAFZZ	3431-01-506-4642	5X475	15451-9627 -0	. . CAP, SEALING	2
6	PAHZZ	PAHZZ	PAFZZ	PAFZZ	5365-01-536-9631	0XWR1	15261-9616 -0	. . PLUG, EXPANSION	1
7	PAHZZ	PAHZZ	PAFZZ	PAFZZ	5315-01-536-9062	0XWR1	05012-0081 4	. . PIN, STRAIGHT	2
8	PAHZZ	PAHZZ	PAFZZ	PAFZZ	4320-01-537-2098	0XWR1	16851-9627 -0	. . CAP, SEALING	3
9	PAHZZ	PAHZZ	PAFZZ	PAFZZ	4730-01-533-4181	1Q0C4	15521-9602 -0	. . PLUG	3
10	PAHZZ	PAHZZ	PAFZZ	PAFZZ	5365-01-506-4655	5X475	15261-9601 -0	. . PLUG	5
11	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-533-2908	1Q0C4	1G513-365 5-0	. . PLUG, OIL GAUGE	1
12	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-537-2064	0XWR1	34150-2758 -0	. . PLUG	1
13	PAHZZ	PAHZZ	PAFZZ	PAFZZ	5365-01-536-9631	0XWR1	15521-9603 -0	. . PLUG	1
14	PAHZZ	PAHZZ	PAFZZ	PAFZZ	5315-01-506-3293	5X475	15231-3396 -0	. . PIN, PIPE	2
15	PAHZZ	PAHZZ	PAFZZ	PAFZZ	4320-01-537-2149	0XWR1	16851-9626 -0	. . CAP, SEALING	3
16	PAHZZ	PAHZZ	PAFZZ	PAFZZ	5315-01-537-1192	0XWR1	17331-5919 -0	. . PIN, PIPE	2
17	PAHZZ	PAHZZ	PAFZZ	PAFZZ	5315-01-536-9063	0XWR1	05012-0050 8	. . PIN, STRAIGHT	2

(1)	(2)				(3)	(4)	(5)	(6)	(7)
SMR CODE									
	a.	b.	c.	d.					
ITEM	AIR					PART	DESCRIPTION AND		
NO.	ARMY	FORCE	NAVY	USMC	NSN	CAGEC	NUMBER	USABLE ON CODE (UOC)	QTY
18	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4820-01-479-0226	0XWR1	15841-7302	. ASSEMBLY COCK, DRAIN	1
						-0			
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE

GROUP 09021801 CONNECTING RODS AND PISTONS REPAIR PARTS LIST

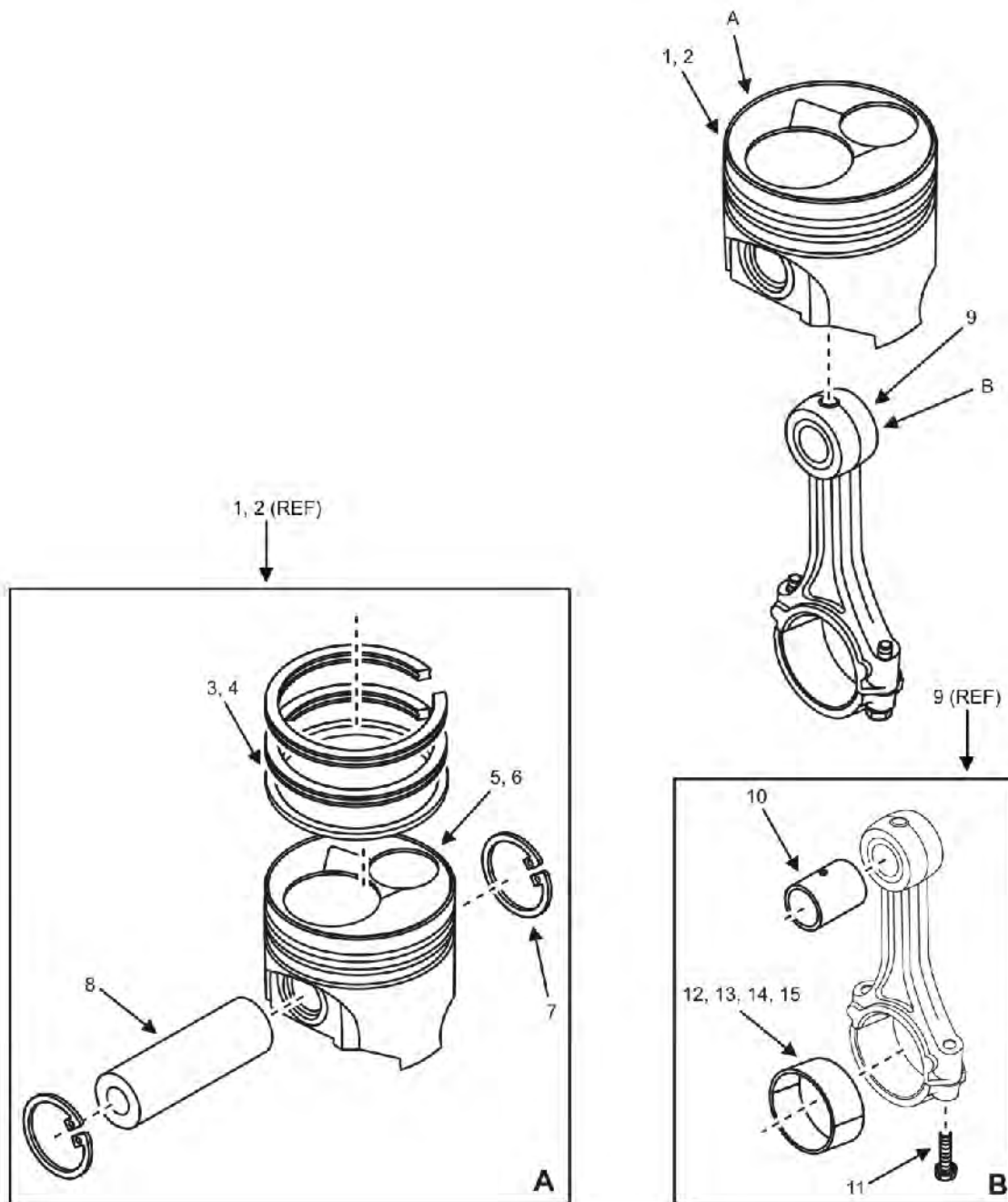


Figure 47. Connecting Rods and Pistons.

(1)	(2)				(3)	(4)	(5)	(6)	(7)
SMR CODE									
a.	b.	c.	d.						
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 09021801 CONNECTING RODS AND PISTONS									
FIGURE 47 CONNECTING RODS AND PISTONS									
1	KFFFF	KFFFF	KFFFF	KFFFF		0XWR1	1G687-217 7-0	. ASSEMBLY, PISTON (STD), (INCLUDES ITEMS 3, 5, 7, 8, AND 10) ...	3
2	KFFFF	KFFFF	KFFFF	KFFFF		0XWR1	1G687-217 8-0	. ASSEMBLY, PISTON (+0.25 MM), (INCLUDES ITEMS 4, 6, 7, 8, AND 10) ...	3
3	PAHZZ	PAHZZ	PAHZZ	PAHZZ	2815-01-587-9127	0XWR1	1G960-210 5-0	. . ASSY, PISTON RING (STD)	3
4	PAHZZ	PAHZZ	PAHZZ	PAHZZ	2815-01-587-9131	0XWR1	1G960-210 9-0	. . ASSY, PISTON RING (+0.25 MM)	3
5	PAHZZ	PAHZZ	PAHZZ	PAHZZ	2815-01-597-2940	44940	1G687-211 1-3	. . PISTON (STD)	3
6	PAHZZ	PAHZZ	PAHZZ	PAHZZ	2815-01-597-2945	0XWR1	1G687-219 0-3	. . PISTON (+0.25 MM)	3
7	PAHZZ	PAHZZ	PAHZZ	PAHZZ	5325-01-321-3445	0XWR1	15261-2133 -0	. . RING, RETAINING, PISTON PIN	6
8	PAHZZ	PAHZZ	PAHZZ	PAHZZ	2815-01-478-7493	0XWR1	16871-2131 -0	. . PIN, PISTON	3
9	PAHHH	PAHHH	PAHHH	PAHHH	2815-01-587-5949	0XWR1	16851-2201 -5	. ASSEMBLY, CONNECTING ROD	3
10	PAHZZ	PAHZZ	PAHZZ	PAHZZ	2815-01-595-3866	0XWR1	16851-2198 -2	. . BUSH, PISTON PIN	3
11	PAHZZ	PAHZZ	PAHZZ	PAHZZ	5306-01-479-0361	0XWR1	1685122140	. . BOLT, CONNECTING ROD	6
12	PAHZZ	PAHZZ	PAHZZ	PAHZZ	3120-01-478-6137	31013	16851-2232 0	. . BEARING, SLEEVE M (STD)	3
13	PAHZZ	PAHZZ	PAHZZ	PAHZZ	5340-01-587-8376	0XWR1	16851-2233 -0	. . BEARING, SLEEVE L (STD)	3
14	PAHZZ	PAHZZ	PAHZZ	PAHZZ	3120-01-478-6135	31013	15861-2297 0	. . BEARING, SLEEVE (-0.20 MM)	3
15	PAHZZ	PAHZZ	PAHZZ	PAHZZ	3120-01-478-6132	31013	15861-2298 0	. . BEARING, SLEEVE (-0.40 MM)	3
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 09021802 CRANKSHAFT REPAIR PARTS LIST

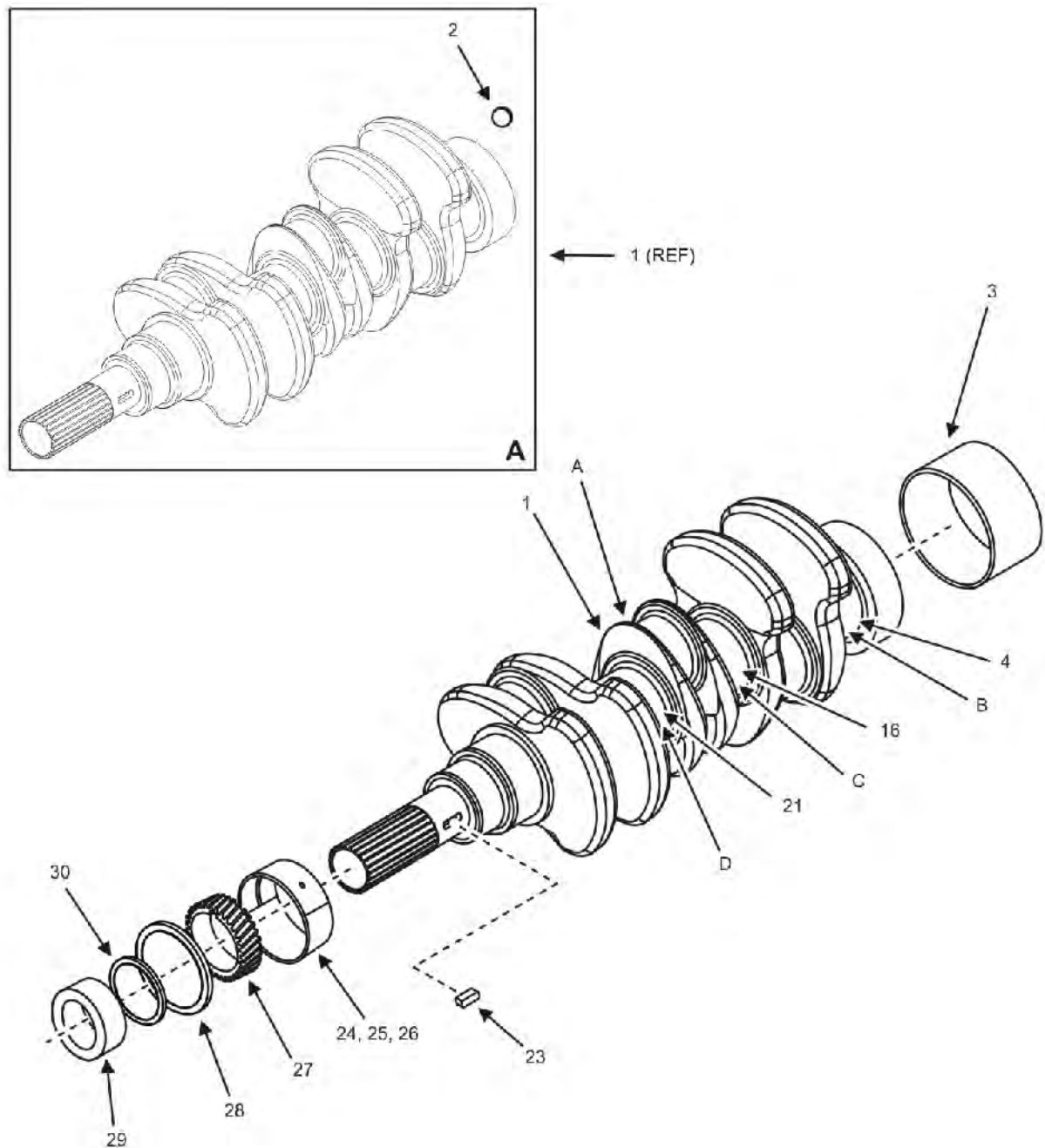


Figure 48. Crankshaft (Sheet 1 of 2).

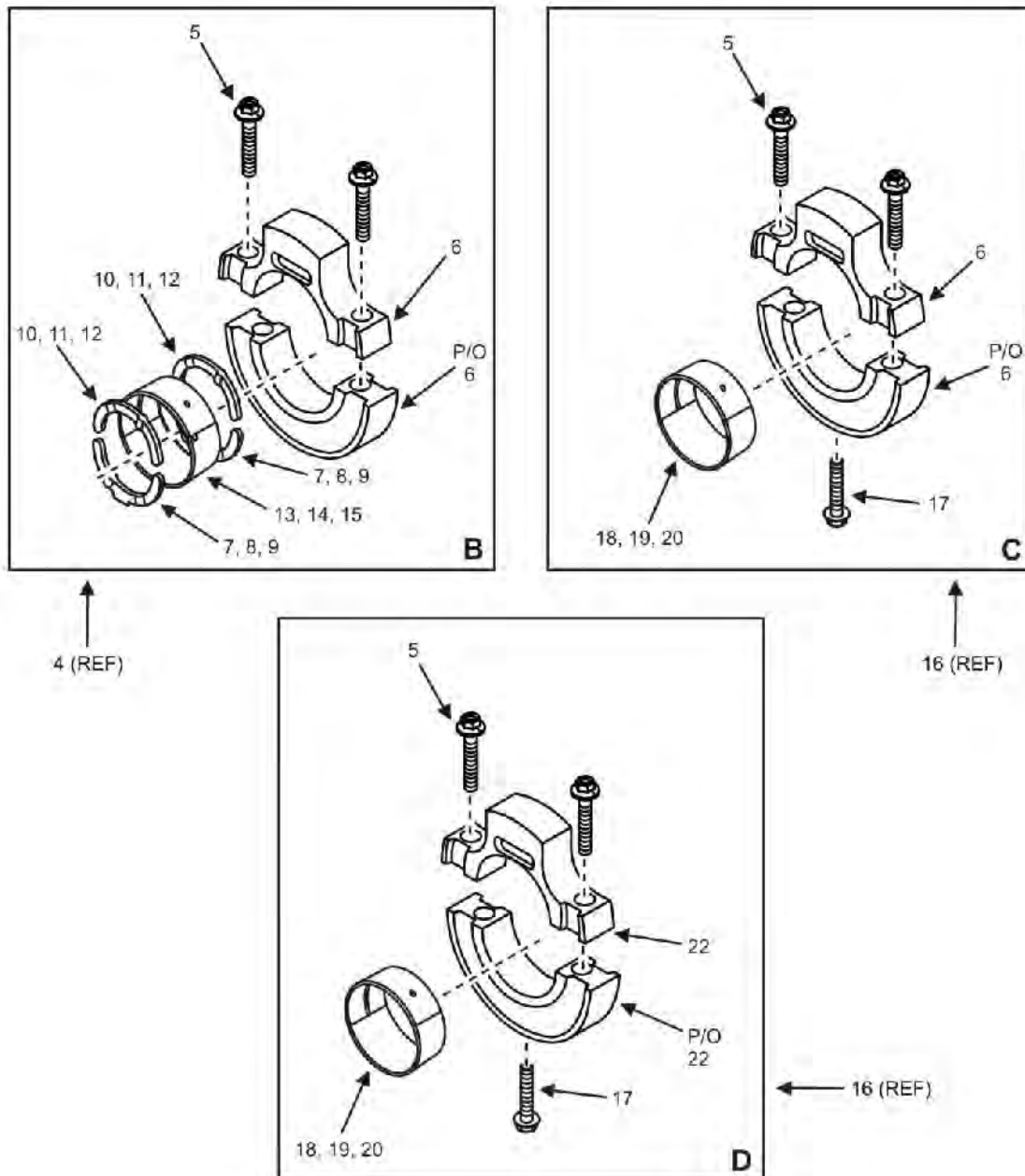


Figure 48. Crankshaft (Sheet 2 of 2).

(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 09021802 CRANKSHAFT FIGURE 48 CRANKSHAFT									
1	PAHHH	PAHHH	PAHHH	PAHHH	4310-01-590-8447	0XWR1	1G962-230 1-2	. COMP CRANKSHAFT	1
2	XBHZZ	XBHZZ	XBHZZ	XBHZZ		0XWR1	07715-0320 7	. . BALL (INCL IN COMP CRANKSHAFT P/N 1G962-2301-2)	3
3	PAHZZ	PAHZZ	PAFZZ	PAFZZ	2815-01-587-6917	0XWR1	19215-2328 -0	. SLEEVE, CRANKSHAFT	1
4	PAHHH	PAHHH	PAFFF	PAFFF	5340-01-588-0262	0XWR1	1G460-070 9-0	. ASSY BRG CASE, (FLYWHEEL)	1
5	PAHZZ	PAHZZ	PAFZZ	PAFZZ	5306-01-588-0255	0XWR1	1G460-045 4-0	. . BOLT, BEARING CASE	6
6	XBHZZ	XBHZZ	XBZZ	XBZZ		0XWR1	1G460-040 9-0	. . ASSY CASE, MAIN BRG. (FLY- WHEEL)	1
7	PAHZZ	PAHZZ	PAFZZ	PAFZZ	5340-01-587-8720	0XWR1	15261-2354 -3	. BEARING, THRUST (STD)	2
8	PAHZZ	PAHZZ	PAFZZ	PAFZZ	5340-01-587-8744	0XWR1	15261-2397 -3	. BEARING, THRUST (+0.20 MM)	2
9	PAHZZ	PAHZZ	PAFZZ	PAFZZ	5340-01-478-6107	0XWR1	15261-2398 -3	. BEARING, THRUST (+0.40 MM)	1
10	PAFZZ	PAFZZ	PAFZZ	PAFZZ	3120-01-478-6117	0XWR1	15261-2353 0	. BEARING, THRUST(STD)	2
11	PAFZZ	PAFZZ	PAFZZ	PAFZZ	3120-01-478-6114	0XWR1	15261-2395 -0	. BEARING, THRUST (+0.20 MM)	2
12	PAHZZ	PAHZZ	PAFZZ	PAFZZ	3120-01-478-6113	0XWR1	15261-2396 0	. . BEARING, THRUST (+0.40 MM)	2
13	PAHZZ	PAHZZ	PAFZZ	PAFZZ	3110-01-587-6857	31013	1G460-238 2-0	. . BEARING, SLEEVE (STD SET)	1
14	PAHZZ	PAHZZ	PAFZZ	PAFZZ	3110-01-587-6944	0XWR1	1G460-239 3-0	. . BEARING, SLEEVE (-0.20 MM SET) ..	1
15	PAHZZ	PAHZZ	PAFZZ	PAFZZ	3110-01-587-6935	0XWR1	1G460-239 5-0	. . BEARING, SLEEVE (-0.40 MM SET) ..	1
16	PAHHH	PAHHH	PAFFF	PAFFF	2990-01-587-9135	0XWR1	1G962-070 5-0	. ASSY BRG CASE, MAIN (MIDDLE)	1
17	PAHZZ	PAHZZ	PAFZZ	PAFZZ	5306-01-479-0360	0XWR1	15841-0456 2	. . BOLT, BEARING CASE	2
18	PAFZZ	PAFZZ	PAFZZ	PAFZZ	3110-01-587-6968	0XWR1	1G460-238 3-0	. . BEARING, SLEEVE (STD SET)	2

(1) ITEM NO.	(2) SMR CODE				(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
19	PAFZZ	PAFZZ	PAFZZ	PAFZZ	3110-01-587-6924	0XWR1	1G460-239 4-0	. . BEARING, SLEEVE (-0.20 MM SET) ..	2
20	PAFZZ	PAFZZ	PAFZZ	PAFZZ	3110-01-587-6956	0XWR1	1G460-239 6-0	. . BEARING, SLEEVE (-0.40 MM SET) ..	2
21	PAHHH	PAHHH	PAFFF	PAFFF	5340-01-588-0260	0XWR1	1G460-070 4-0	. ASSY BRG CASE, MAIN (FRONT)	1
22	XBHZZ	XBHZZ	XBFZZ	XBFZZ		0XWR1	1G460-040 4-0	. . ASSY CASE, MAIN BRG (FRONT)	1
23	PAHZZ	PAHZZ	PAFZZ	PAFZZ	5315-01-321-2001	0XWR1	05712-0051 5	. KEY, SHAFT	1
24	PAHZZ	PAHZZ	PAFZZ	PAFZZ	2815-01-587-5843	0XWR1	1G460-234 7-0	. BEARING, SLEEVE (STD)	1
25	PAHZZ	PAHZZ	PAFZZ	PAFZZ	2895-01-587-5845	0XWR1	1G460-239 1-0	. BEARING, SLEEVE (-0.20 MM)	1
26	PAHZZ	PAHZZ	PAFZZ	PAFZZ	2895-01-587-5851	0XWR1	1G460-239 2-0	. . BEARING, SLEEVE (-0.40 MM)	1
27	PAHZZ	PAHZZ	PAFZZ	PAFZZ	3020-01-479-0690	0XWR1	15841-2411 -0	. GEAR, CRANK	1
28	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2815-01-479-0929	0XWR1	15881-2331 -0	. SLINGER, OIL	1
29	PAHZZ	PAHZZ	PAFZZ	PAFZZ	3110-01-478-6106	31013	15841-2325 0	. . COLLAR, CRANKSHAFT	1
30	PAHZZ	PAHZZ	PAFZZ	PAFZZ	5331-01-589-4780	0XWR1	04814-1622 0	. . O-RING	1
31	PAHZZ	PAHZZ	PAFZZ	PAFZZ	3120-01-619-8956	0XWR1	1G962-237 5-2	. . SET, BEARING, ENGINE COMPLETE (STD) (NOT SHOWN), (INCLUDES ITEMS 7, 10, 13, 18, 24 PLUS ITEMS 12 AND 13 FROM FIGURE 47)	1
32	PAHZZ	PAHZZ	PAFZZ	PAFZZ	3120-01-619-9835	0XWR1	1G962-237 6-2	. . SET, BEARING, ENGINE COMPLETE (±0.20 MM) (NOT SHOWN), (INCLUDES ITEMS 8, 11, 14, 19, 25 PLUS ITEM 14 FROM FIGURE 47)	1
33	PAHZZ	PAHZZ	PAFZZ	PAFZZ	3120-01-620-2608	0XWR1	1G962-237 7-2	. . SET, BEARING, ENGINE COMPLETE (±0.40 MM) (NOT SHOWN), (INCLUDES ITEMS 9, 12, 15, 20, 26 PLUS ITEM 15 FROM FIGURE 47)	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 09021803 GEAR CASE COVER REPAIR PARTS LIST

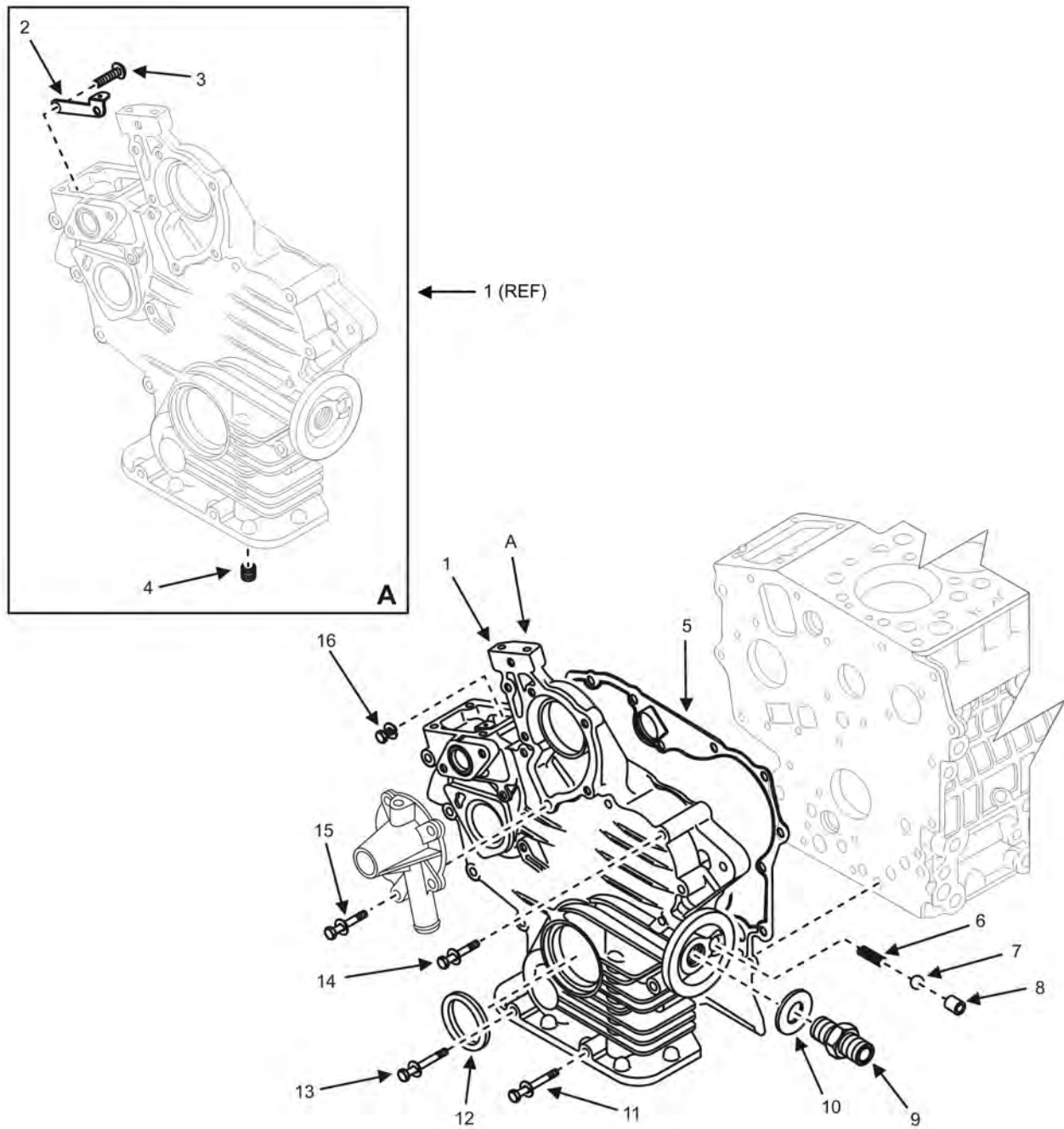


Figure 49. Gear Case Cover.

(1)	(2)				(3)	(4)	(5)	(6)	(7)
SMR CODE									
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 09021803 GEAR CASE COVER									
FIGURE 49 GEAR CASE COVER									
1	XBFHH	XBFHH	XBFHH	XBFHH		30554	16825-0402-4	. COMP. CASE GEAR	1
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-589-5760	0XWR1	1G820-5628-2	. . STAY, START SPRING	1
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-500-8690	0XWR1	16861-93310	. . SCREW	1
4	PAHZZ	PAHZZ	PAFZZ	PAFZZ	5365-01-536-9631	0XWR1	15521-9603-0	. . PLUG	2
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5330-01-589-5764	0XWR1	1G820-0413-0	. GASKET, GEAR CASE	1
6	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-98-205-9079	0XWR1	16851-3695-0	. SPRING	1
7	PAFZZ	PAFZZ	PAFFF	PAFFF	4820-01-478-1226	48200	07715-03211	. BALL	1
8	PAFZZ	PAFZZ	PAFFF	PAFFF	2815-01-478-7478	0XWR1	15841-3693-0	. SEAT,VALVE	1
9	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-534-1985	0XWR1	15241-3229-0	. JOINT, PIPE	1
10	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-537-0005	0XWR1	15481-9401-0	. WASHER, PLAIN	1
11	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-500-8701	0XWR1	01023-50690	. BOLT	1
12	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5330-01-478-4887	0XWR1	15877-04140	. SEAL, OIL	1
13	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-435-8407	0XWR1	01023-50680	. BOLT	2
14	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-500-8701	0XWR1	01023-60650	. BOLT	9
15	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-479-0355	0XWR1	15841-91010	. BOLT	2
16	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-507-0141	0XWR1	01023-50618	. BOLT	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 09021804 HARMONIC BALANCER REPAIR PARTS LIST

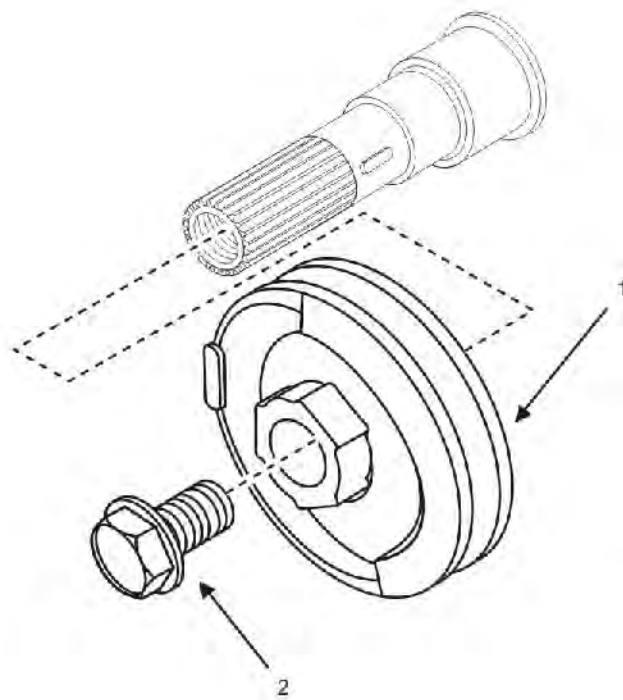


Figure 50. Harmonic Balancer.

(1)	(2)				(3)	(4)	(5)	(6)	(7)
SMR CODE									
	a.	b.	c.	d.					
ITEM	AIR					PART	DESCRIPTION AND		
NO.	ARMY	FORCE	NAVY	USMC	NSN	CAGEC	NUMBER	USABLE ON CODE (UOC)	QTY
GROUP 09021804 HARMONIC BAL- ANCER									
FIGURE 50 HARMONIC BALANCER									
1	PAFZZ	PAFZZ	PAFZZ	PAFZZ	3020-01-589-9931	0XWR1	1G962-742	. PULLEY, FAN DRIVE	1
							8-0		
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-479-0367	0XWR1	15881-9103	. BOLT	1
							0		
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 09021805 CAMSHAFT AND GEAR REPAIR PARTS LIST

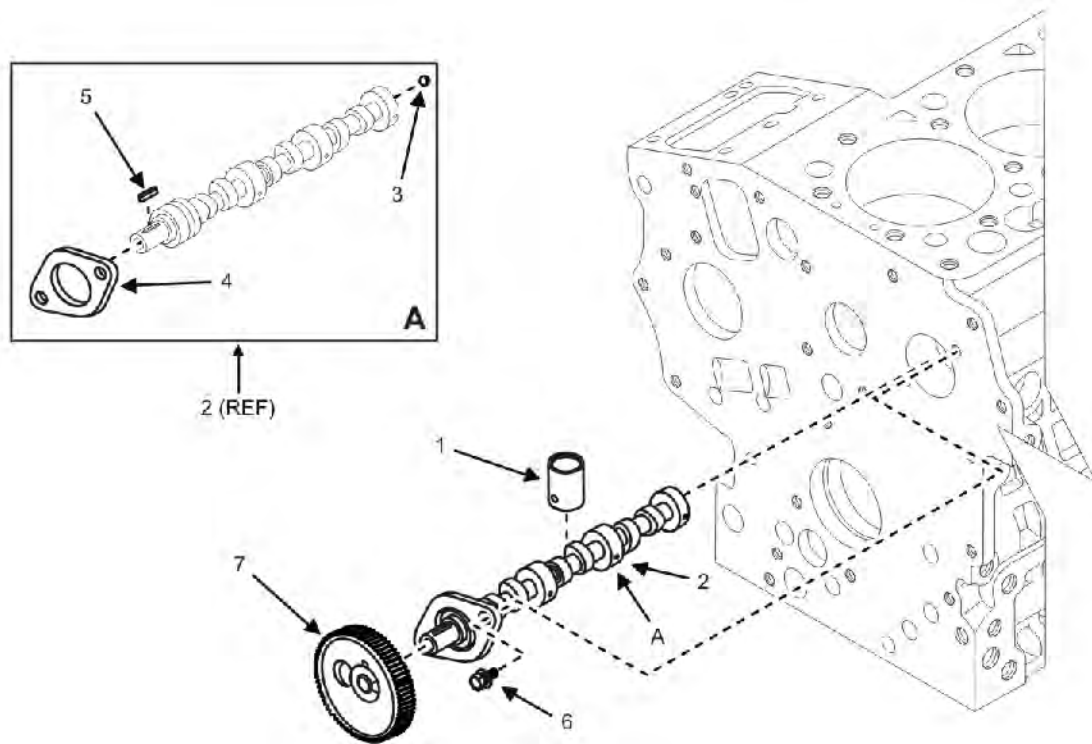


Figure 51. Camshaft and Gear.

(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 09021805 CAMSHAFT AND GEAR									
FIGURE 51 CAMSHAFT AND GEAR									
1	PAHZZ	PAHZZ	PAFZZ	PAFZZ	4810-01-586-9239	0XWR1	16851-1555 -2	. TAPPET	6
2	PAHHH	PAHHH	PAFFF	PAFFF	2895-01-587-6053	0XWR1	1G962-160 1-5	. ASSEMBLY, CAMSHAFT	1
2	PAHZZ	PAHZZ	PAFFF	PAFFF	2815-01-536-0903	1Q0C4	07715-0040 1	. . BALL	1
4	PAHZZ	PAHZZ	PAFFF	PAFFF	5340-01-536-9608	0XWR1	15841-1627 -0	. . STOP, MECHANICAL	1
5	PAHZZ	PAHZZ	PAFFF	PAFFF	5315-01-321-0400	0XWR1	05712-0051 8	. . KEY, MACHINE	1
6	PAHZZ	PAHZZ	PAFFF	PAFFF	5306-01-321-3371	S4532	01023-5061 2	. BOLT	2
7	PAHZZ	PAHZZ	PAFZZ	PAFZZ	3020-01-537-2137	0XWR1	16864-1651 -0	. GEAR, CAMSHAFT	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 09021806 IDLER GEAR REPAIR PARTS LIST

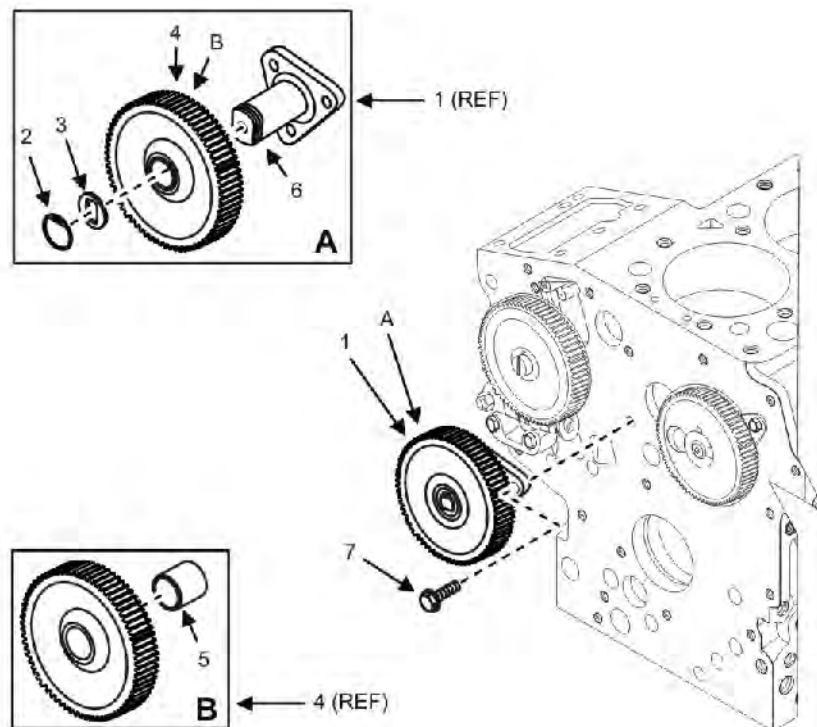


Figure 52. Idler Gear.

(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 09021806 IDLER GEAR FIGURE 52 IDLER GEAR									
1	PAHHH	PAHHH	PAFFF	PAFFF	3020-01-537-1182	0XWR1	15875-9934-0	. ASSEMBLY, IDLER GEAR	1
2	PAHZZ	PAHZZ	PAFZZ	PAFZZ	5325-01-478-6921	0XWR1	15875-24320	. . RING, SNAP	1
3	PAHZZ	PAHZZ	PAFZZ	PAFZZ	3040-01-537-1181	0XWR1	15785-2437-0	. . COLLAR, IDLER GEAR	1
4	PAHHH	PAHHH	PAFFF	PAFFF	3020-01-486-7673	0XWR1	15875-24013	. . GEAR, IDLER	1
5	PAHZZ	PAHZZ	PAFZZ	PAFZZ	3120-01-537-1179	0XWR1	15875-2428-2	. . . BUSHING	1
6	PAHZZ	PAHZZ	PAFZZ	PAFZZ	3040-01-537-1790	0XWR1	15875-2425-0	. . SHAFT, IDLER GEAR	1
7	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-320-7024	S4532	01023-50614	. BOLT	3
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 09021807 FUEL CAMSHAFT AND FORK ASSEMBLY REPAIR PARTS LIST

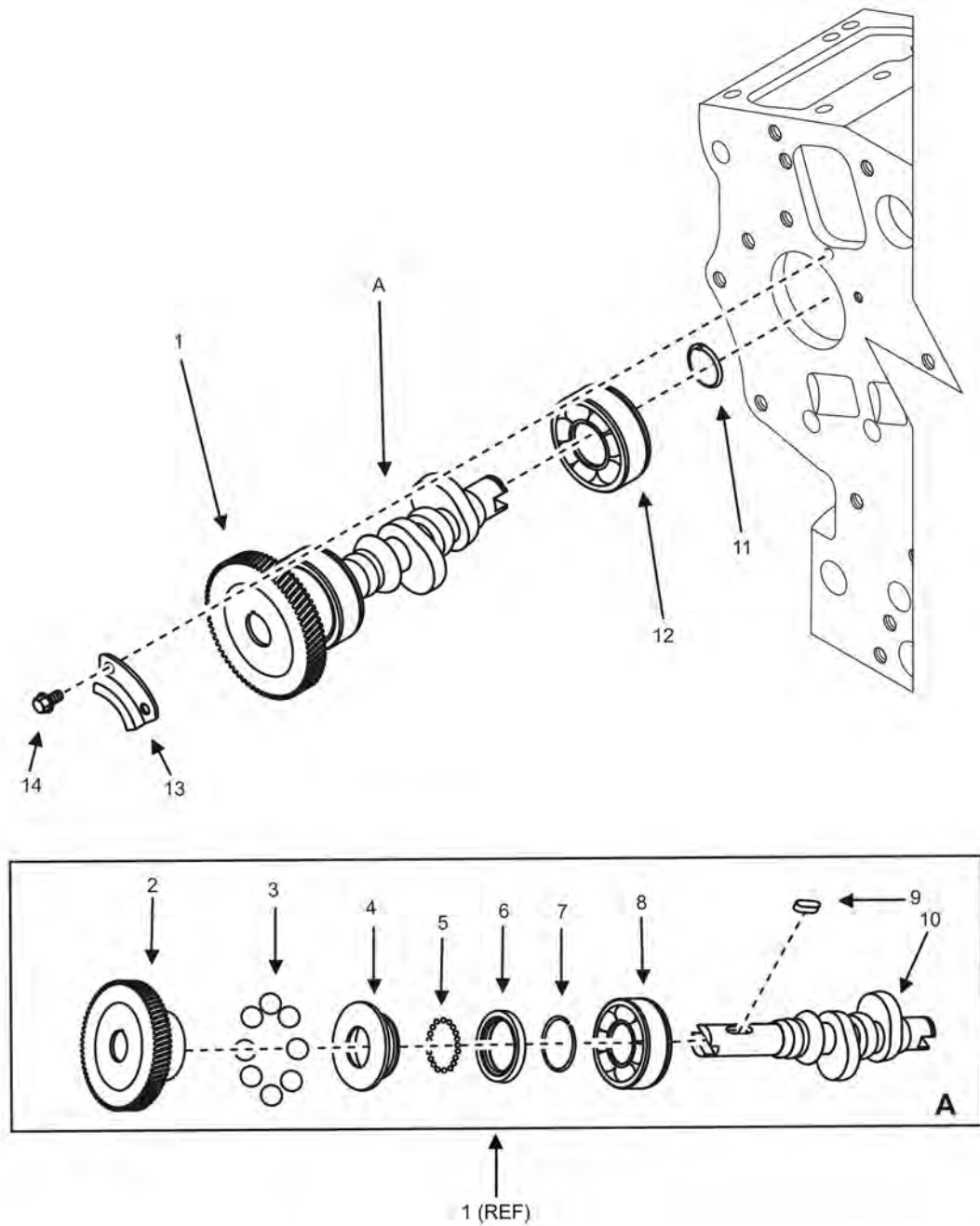


Figure 53. Fuel Camshaft and Fork Assembly (Sheet 1 of 2).

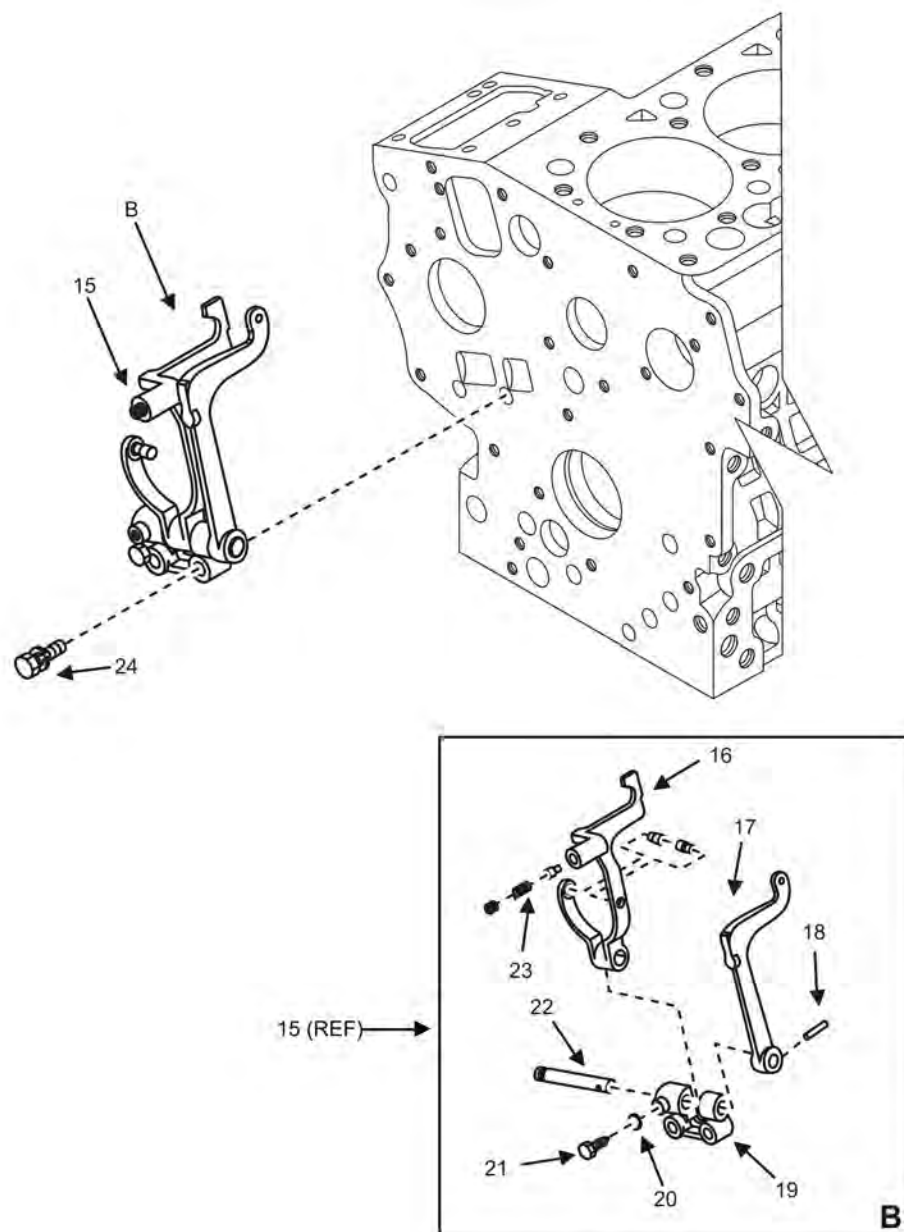


Figure 53. Fuel Camshaft and Fork Assembly (Sheet 2 of 2).

(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 09021807 FUEL CAMSHAFT AND FORK ASSEMBLY FIGURE 53 FUEL CAMSHAFT AND FORK ASSEMBLY									
1	PAHHH	PAHHH	PAFFF	PAFFF	2815-01-587-5938	OXWR1	16861-1602-4	. ASSEMBLY, CAMSHAFT FUEL	1
2	PAHZZ	PAHZZ	PAFZZ	PAFZZ	3020-01-537-1183	OXWR1	16851-5115-0	. . GEAR, INJECTION PUMP	1
3	PAHZZ	PAHZZ	PAFZZ	PAFZZ	2815-01-587-5919	OXWR1	07715-03217	. . BALL	8
4	PAHZZ	PAHZZ	PAHZZ	PAHZZ	2815-01-587-5862	OXWR1	15841-5545-2	. . SLEEVE, GOVERNOR	1
5	PAHZZ	PAHZZ	PAFZZ	PAFZZ	3110-01-536-9064	OXWR1	07715-00801	. . BALL	32
6	PAHZZ	PAHZZ	PAFZZ	PAFZZ	3110-01-537-0879	OXWR1	15841-5569-0	. . CASE, GOVERNOR BALL	1
7	PAHZZ	PAHZZ	PAFZZ	PAFZZ	5340-14-514-1736	OXWR1	15261-5547-0	. . CIR-CLIP, GOVERNOR SLEEVE	1
8	PAHZZ	PAHZZ	PAFZZ	PAFZZ	3110-01-536-8999	OXWR1	08153-06203	. . BEARING, BALL	1
9	PAHZZ	PAHZZ	PAHZZ	PAHZZ	5315-01-321-2001	OXWR1	05712-00515	. . KEY	1
10	PAHZZ	PAHZZ	PAFZZ	PAFZZ	2895-01-587-3807	OXWR1	15875-1617-3	. . CAMSHAFT FUEL	1
11	PAHZZ	PAHZZ	PAFZZ	PAFZZ	5325-01-486-3846	OXWR1	04612-00170	. CIR-CLIP	1
12	PAHZZ	PAHZZ	PAFZZ	PAFZZ	3110-01-586-2415	OXWR1	16871-9730-0	. BEARING, BALL	1
13	XBHZZ	XBHZZ	XBHZZ	XBHZZ		OXWR1	15841-1632-0	STOPPER, FUEL CAMSHAFT	1
14	PAHZZ	PAHZZ	PAFZZ	PAFZZ	5306-01-321-3371	S4532	01023-50612	. BOLT, MACHINE	2
15	PAFFF	PAFFF	PAFFF	PAFFF	5340-01-590-6569	OXWR1	1E152-5605-0	. ASSEMBLY LEVER, FORK	1
16	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-536-9610	OXWR1	15841-5606-0	. . CLEVIS, ROD END	1
17	PAFFF	PAFFF	PAFFF	PAFFF	5340-01-536-9609	OXWR1	15841-5613-0	. . LEVER, FORK	1

(1)	(2)				(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE				NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
18	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5315-01-478-6939	0XWR1	05411-0031 8	. . . PIN, SPRING	1
19	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-537-1710	0XWR1	15841-5623 -0	. . . HOLDER, FORK LEVER	1
20	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-536-9994	0XWR1	04512-6005 0	. . . WASHER, SPRING	1
21	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-537-0876	0XWR1	15261-6641 -0	. . BOLT, MACHINE	1
22	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-539-9611	0XWR1	15841-5615 -0	. . SHAFT, FORK LEVER	1
23	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5360-01-586-9113	0XWR1	16000-5423 -0	. . SPRING	1
24	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-479-0363	0XWR1	01023-5063 5	. BOLT, MACHINE	2
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 09021808 OIL PUMP AND GEAR REPAIR PARTS LIST

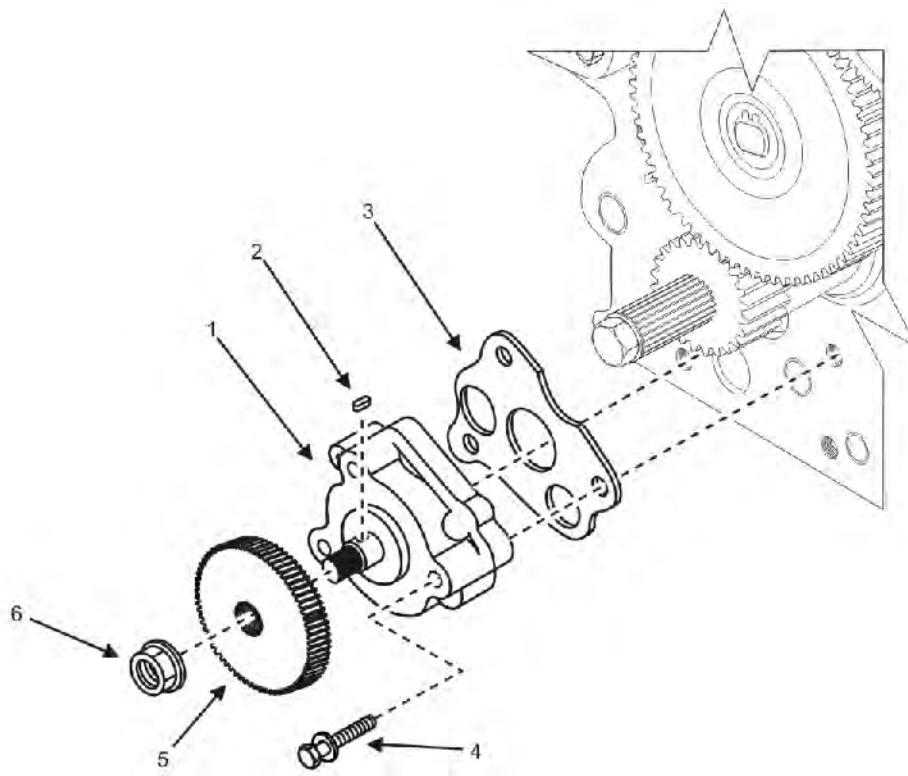


Figure 54. Oil Pump and Gear.

(1)	(2)				(3)	(4)	(5)	(6)	(7)
SMR CODE									
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 09021808 OIL PUMP AND GEAR									
FIGURE 54 OIL PUMP AND GEAR									
1	PAHZZ	PAHZZ	PAFZZ	PAFZZ	2815-01-597-6223	52AH2	16851-3501-2	. OIL PUMP	1
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5315-01-486-1942	0XWR1	05712-00408	. KEY	1
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5330-01-478-6354	0XWR1	16851-35152	. GASKET, OIL PUMP	1
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5306-01-479-0327	0XWR1	15841-9105-0	. BOLT	3
5	PAFZZ	PAFZZ	PAFZZ	PAFZZ	3010-01-486-7671	0XWR1	15841-35660	. GEAR, OIL PUMP DRIVE	1
6	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-478-5170	0XWR1	02783-50100	. NUT, FLANGE	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 10 ENGINE WIRING HARNESS REPAIR PARTS LIST

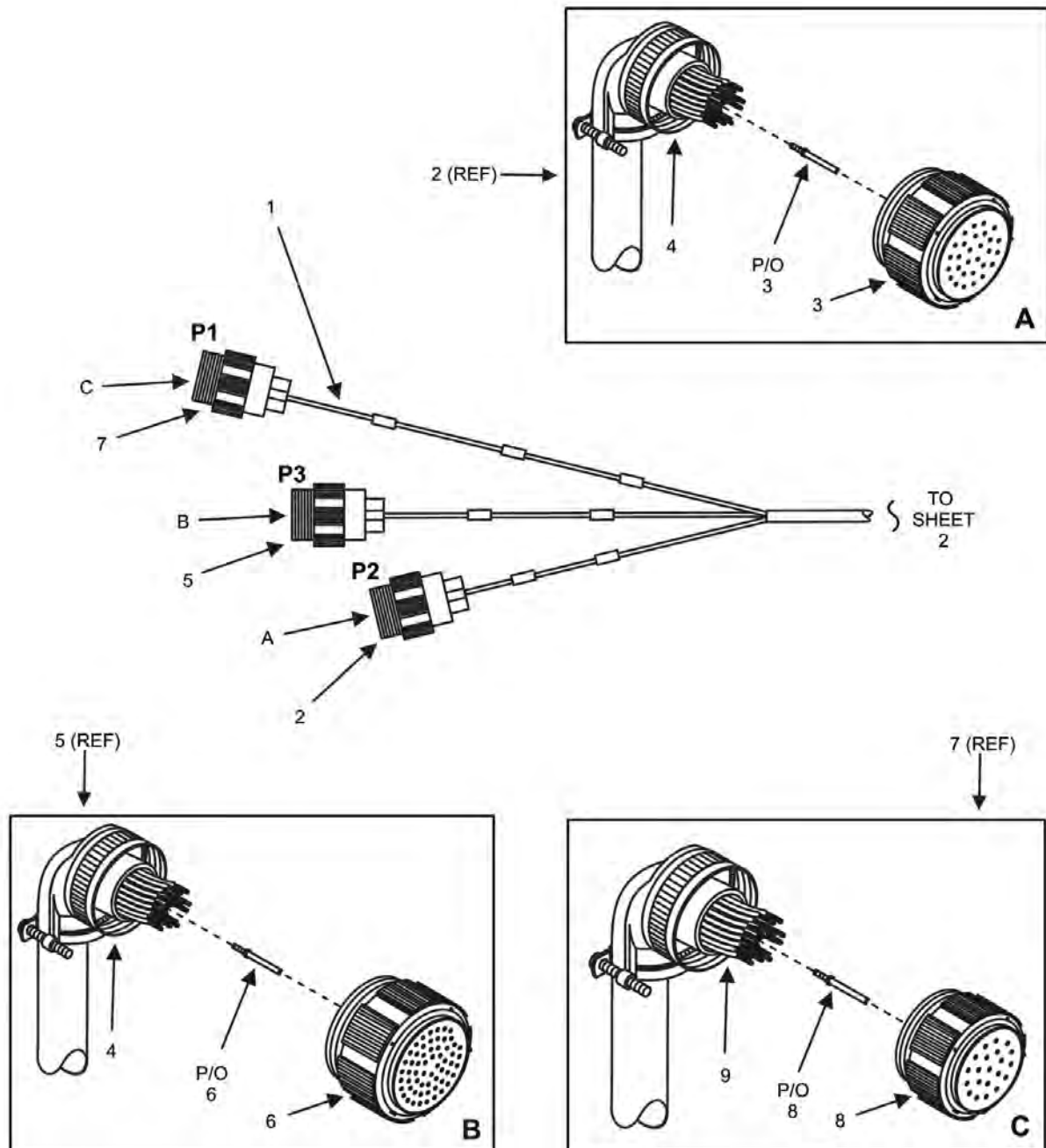


Figure 55. Engine Wiring Harness (Sheet 1 of 16).

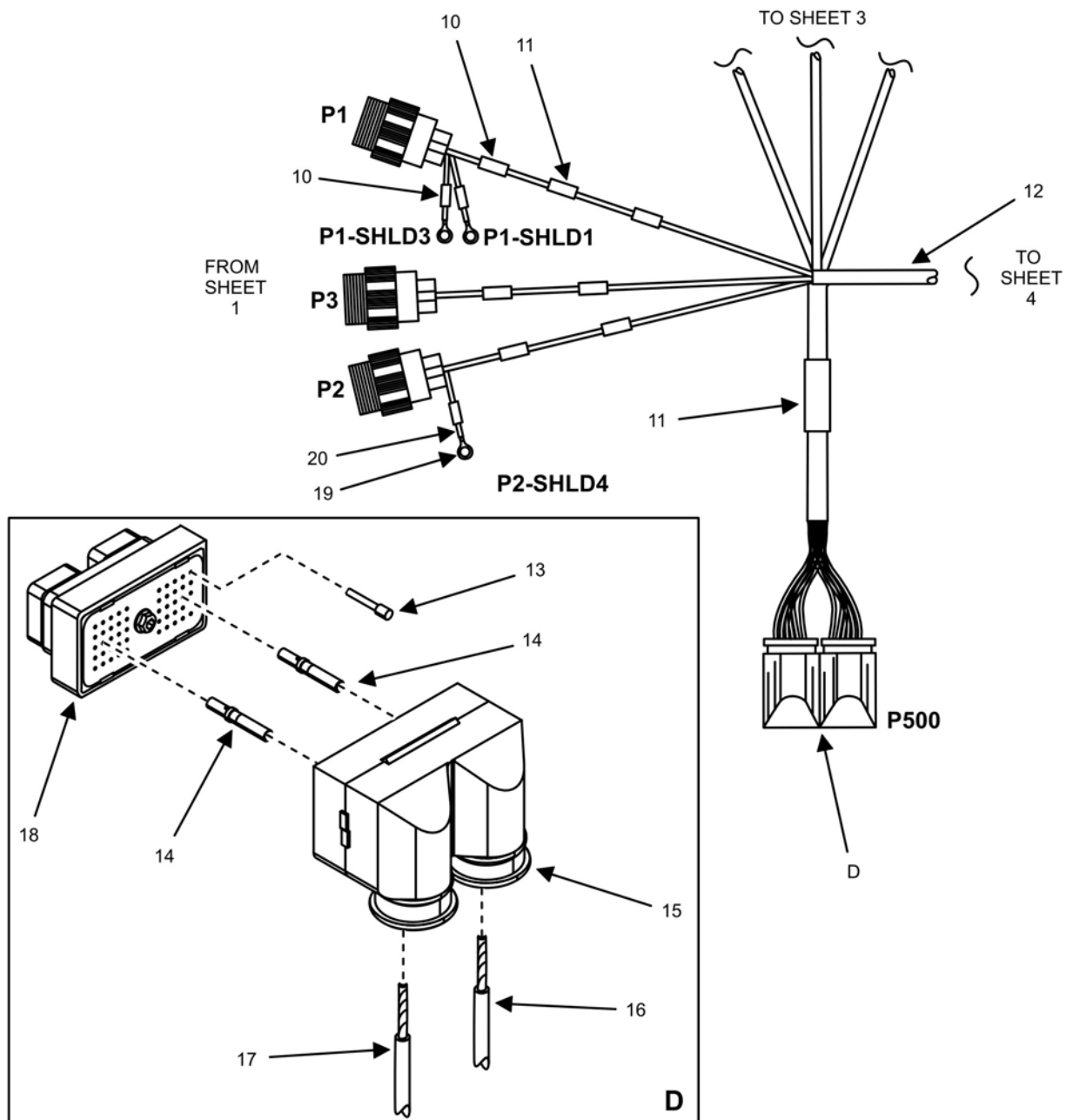


Figure 55. Engine Wiring Harness (Sheet 2 of 16).

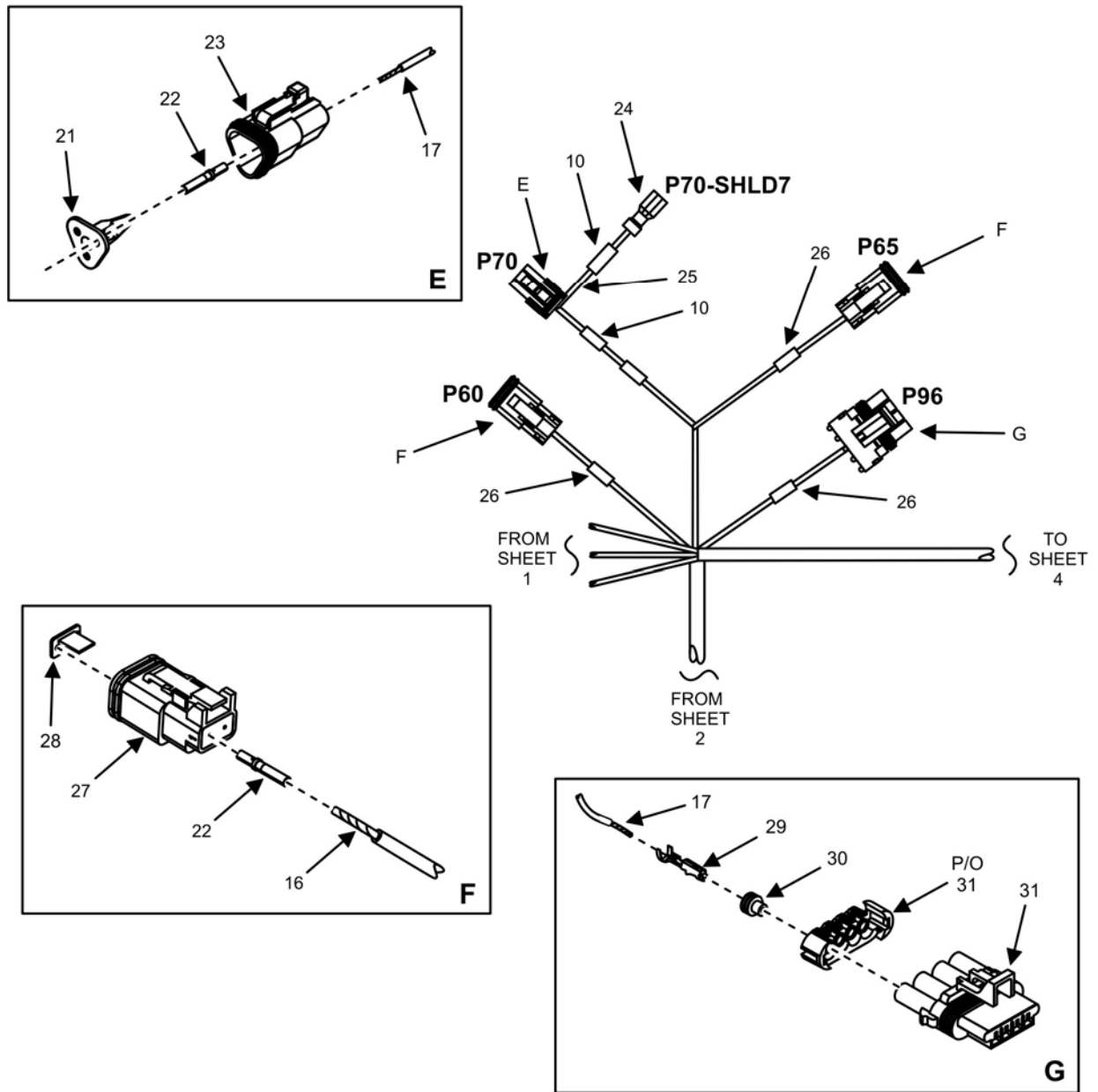


Figure 55. Engine Wiring Harness (Sheet 3 of 16).

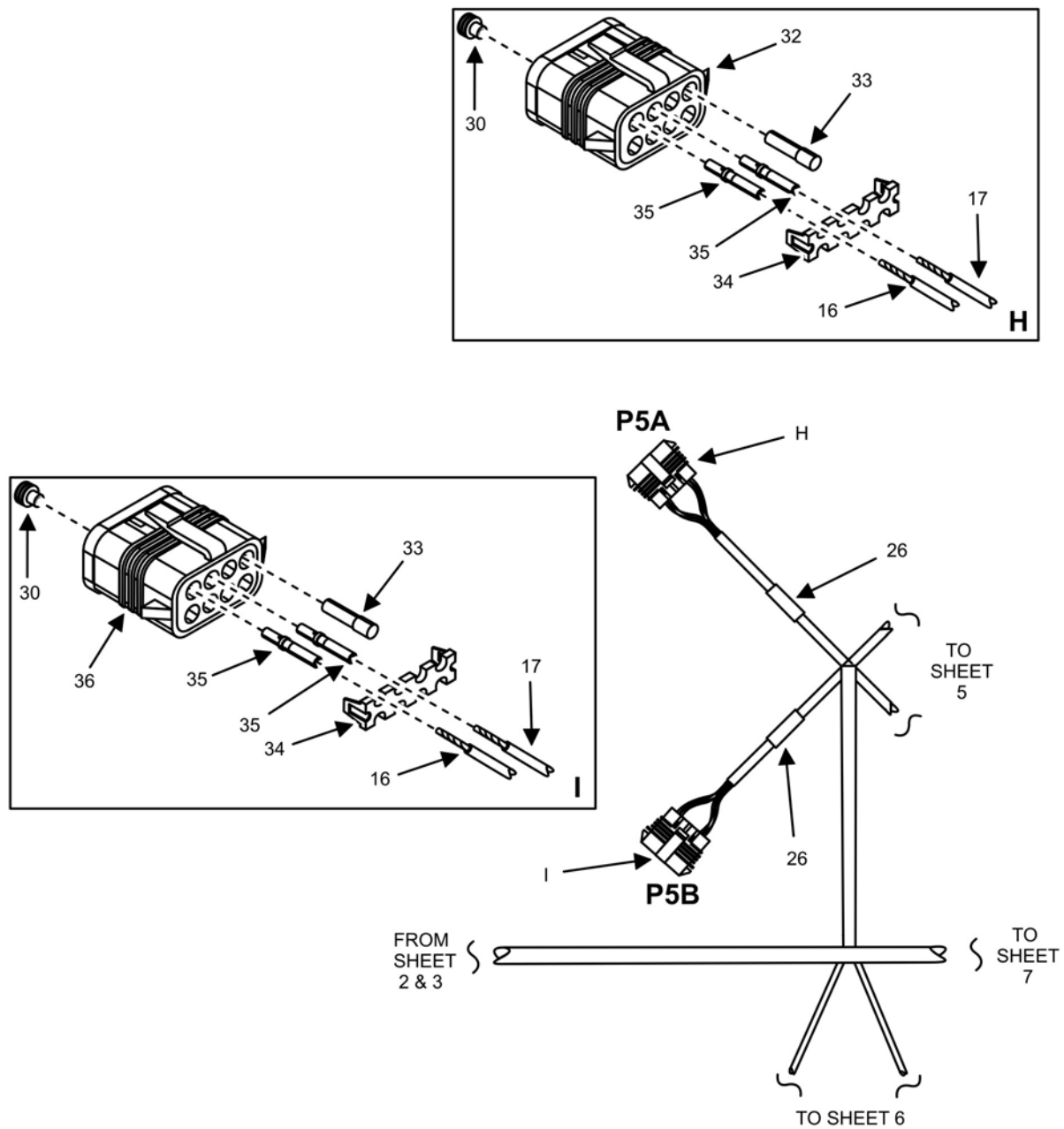


Figure 55. Engine Wiring Harness (Sheet 4 of 16).

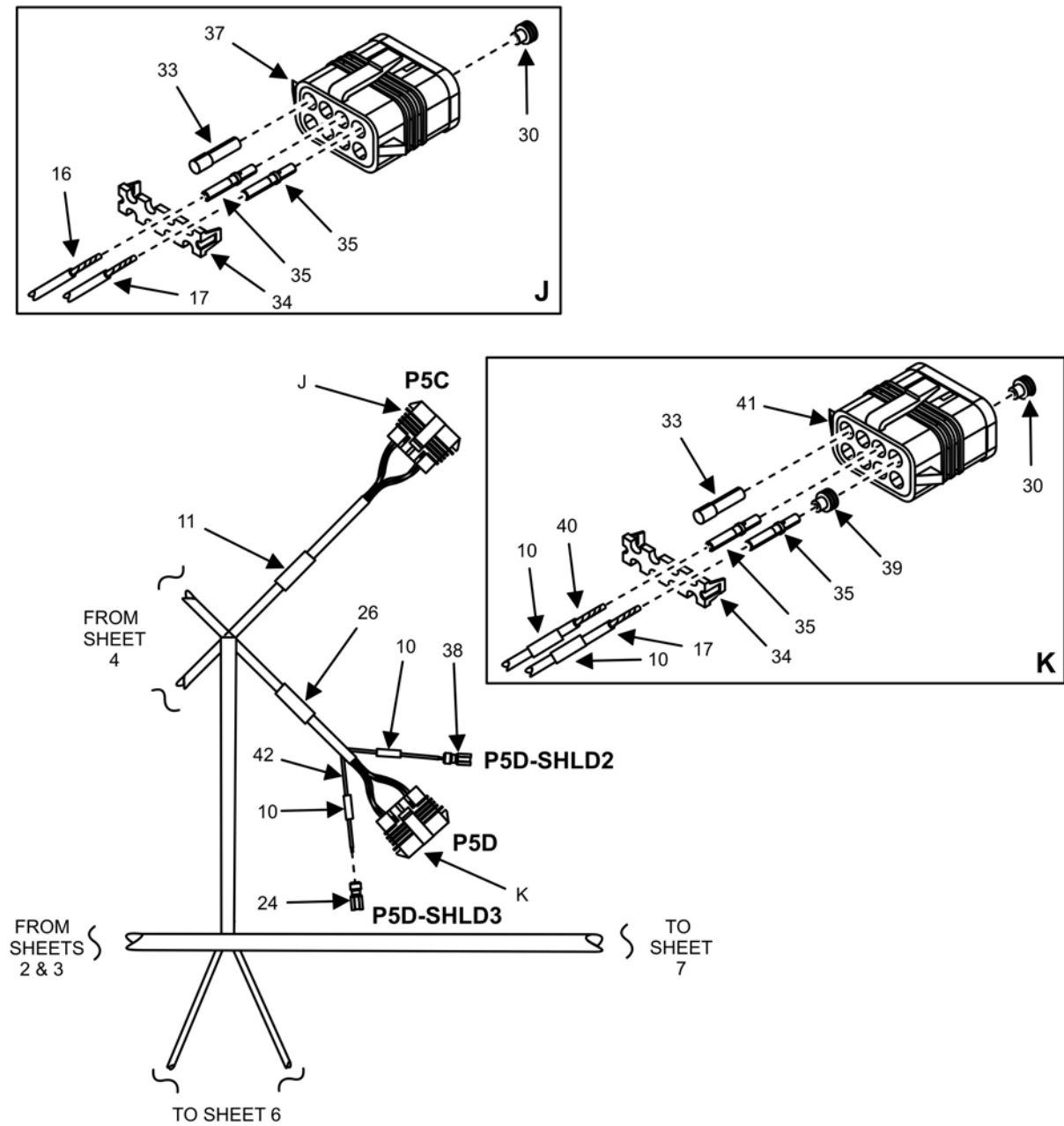


Figure 55. Engine Wiring Harness (Sheet 5 of 16).

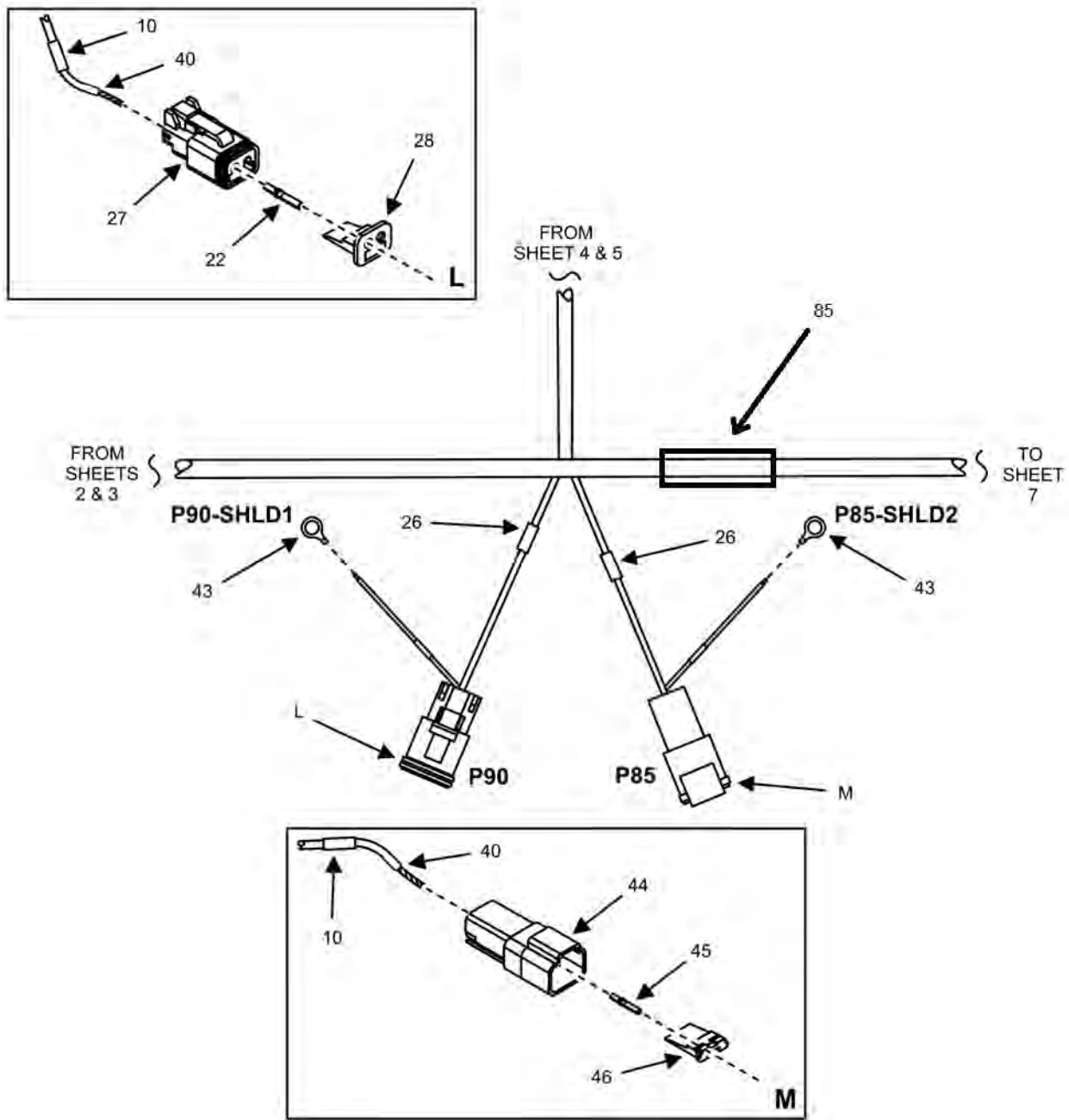


Figure 55. Engine Wiring Harness (Sheet 6 of 16).

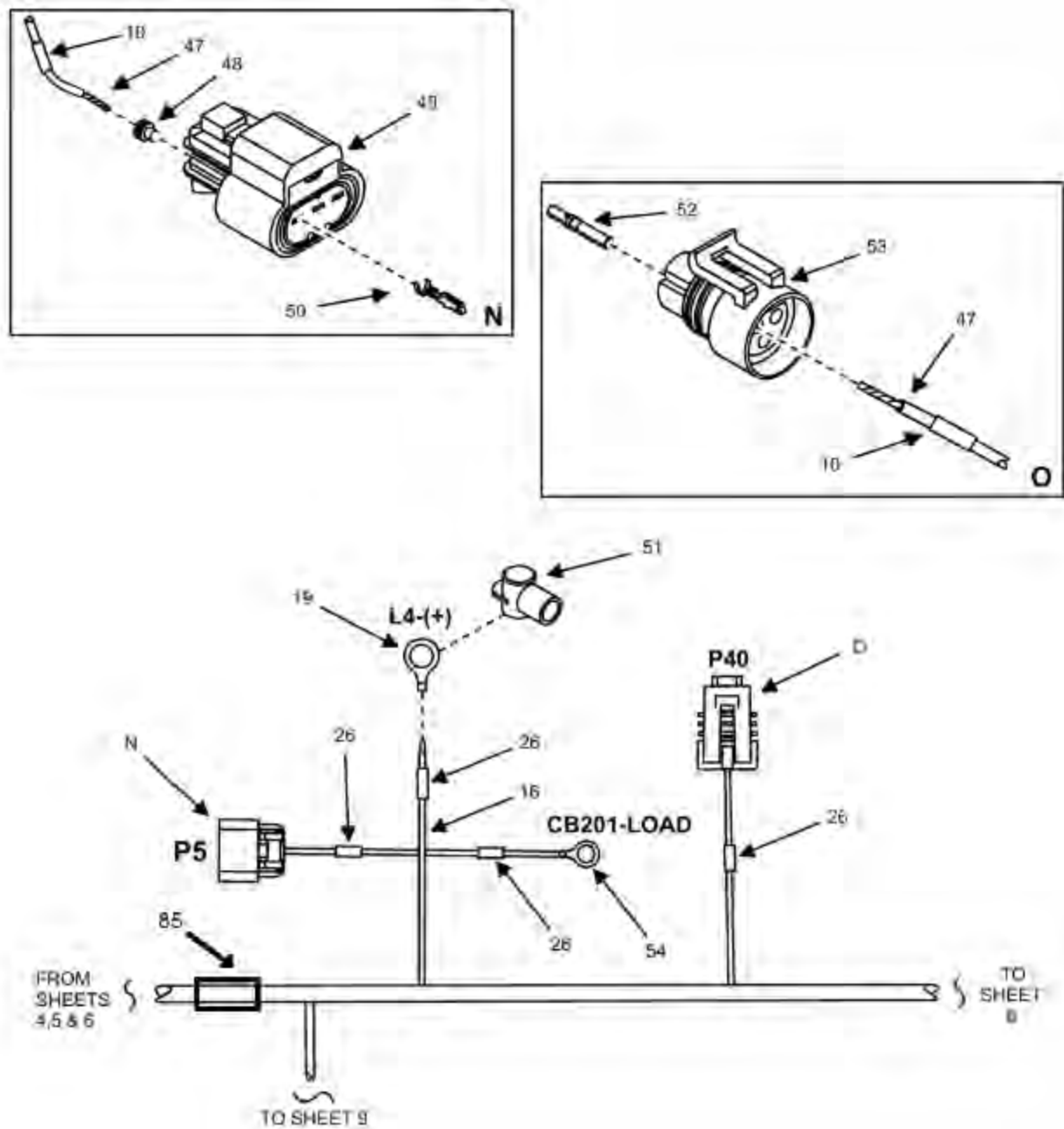


Figure 55. Engine Wiring Harness (Sheet 7 of 16).

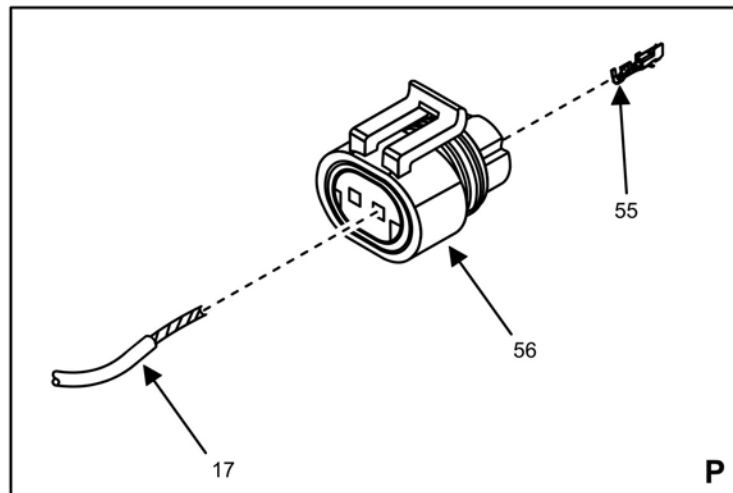
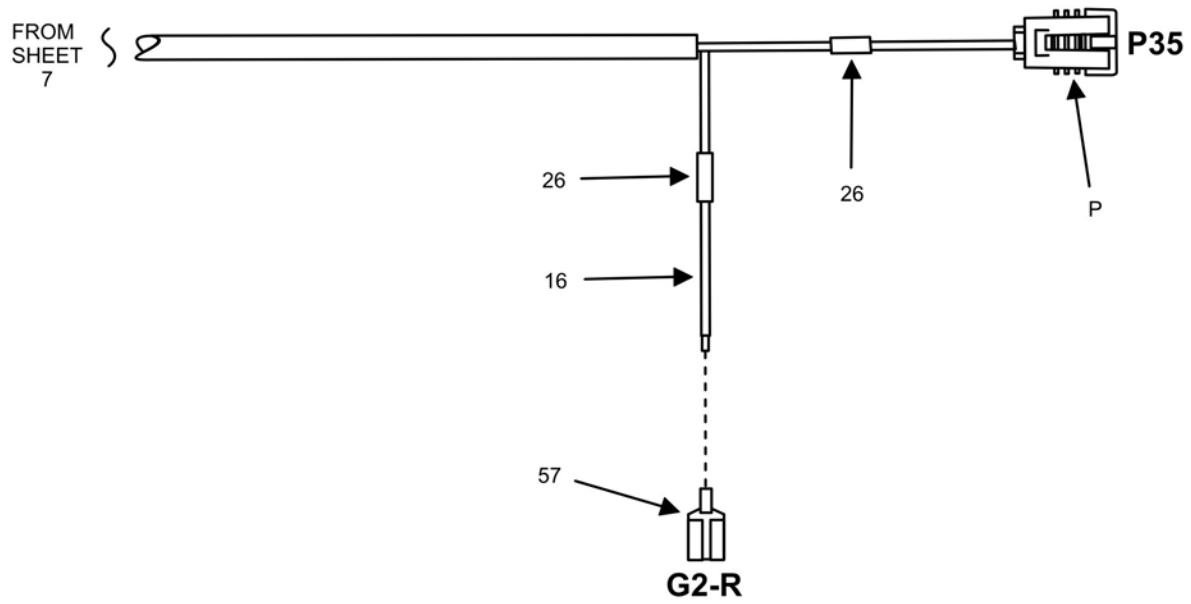


Figure 55. Engine Wiring Harness (Sheet 8 of 16).



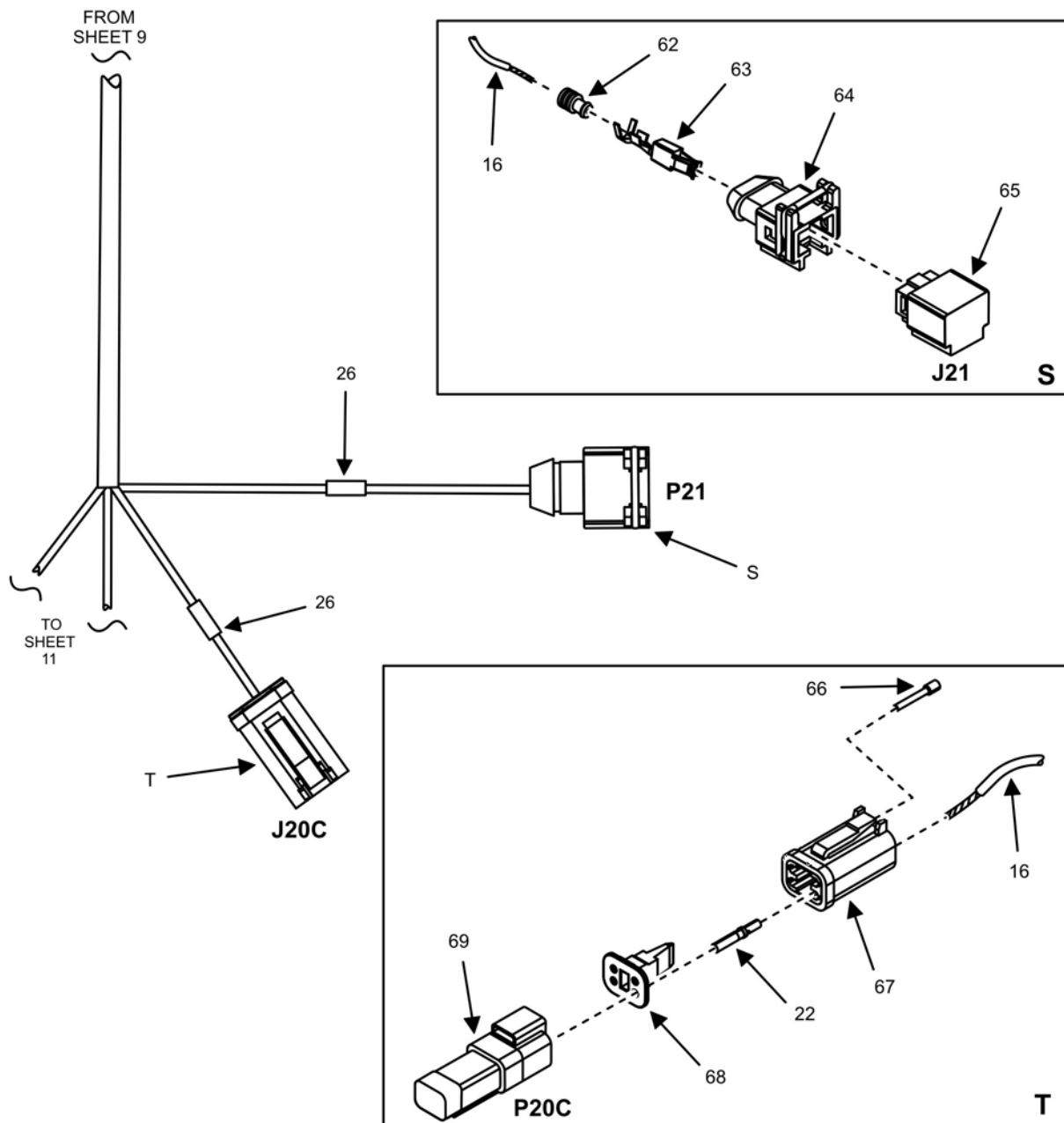


Figure 55. Engine Wiring Harness (Sheet 10 of 16).

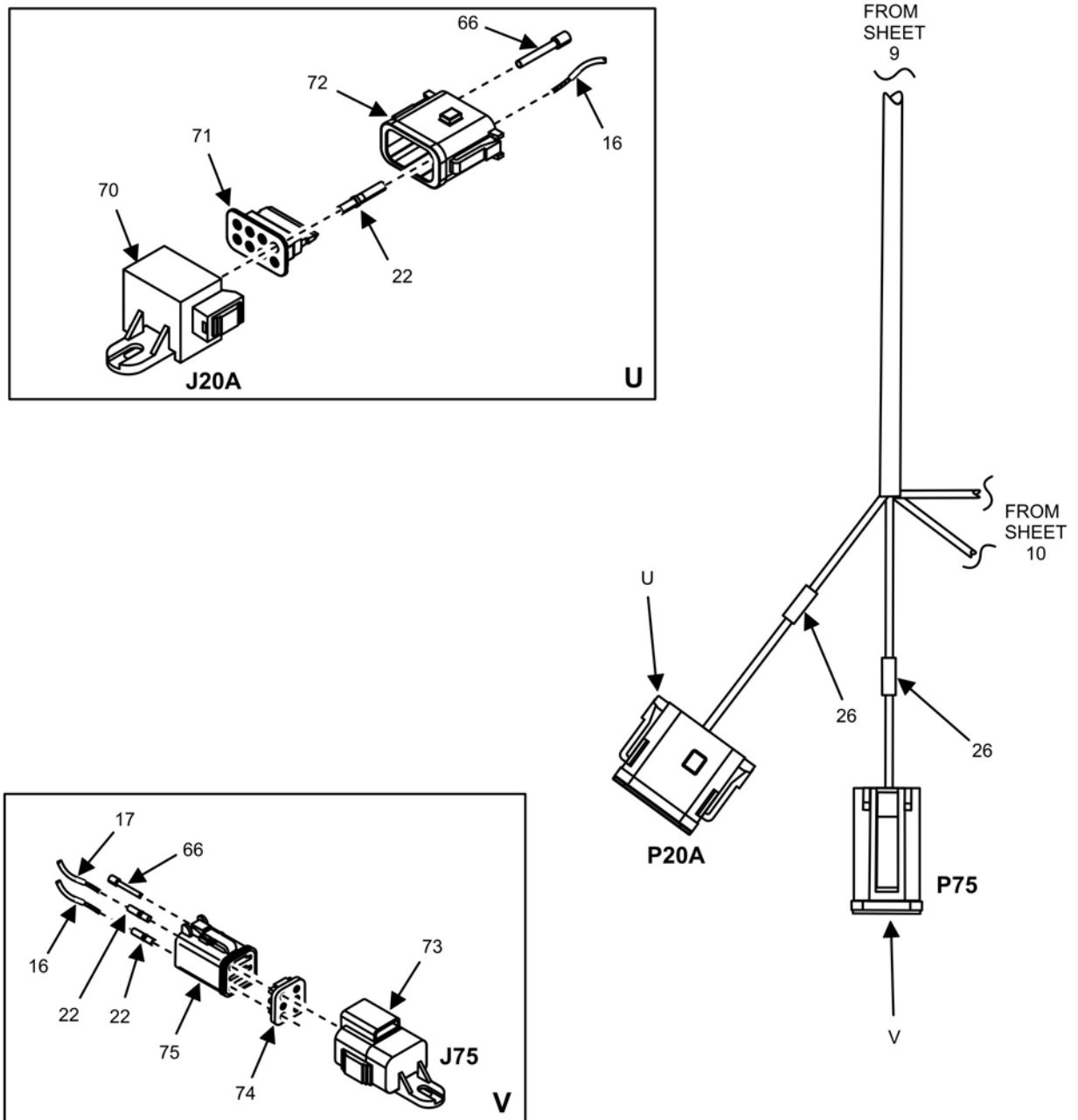


Figure 55. Engine Wiring Harness (Sheet 11 of 16).

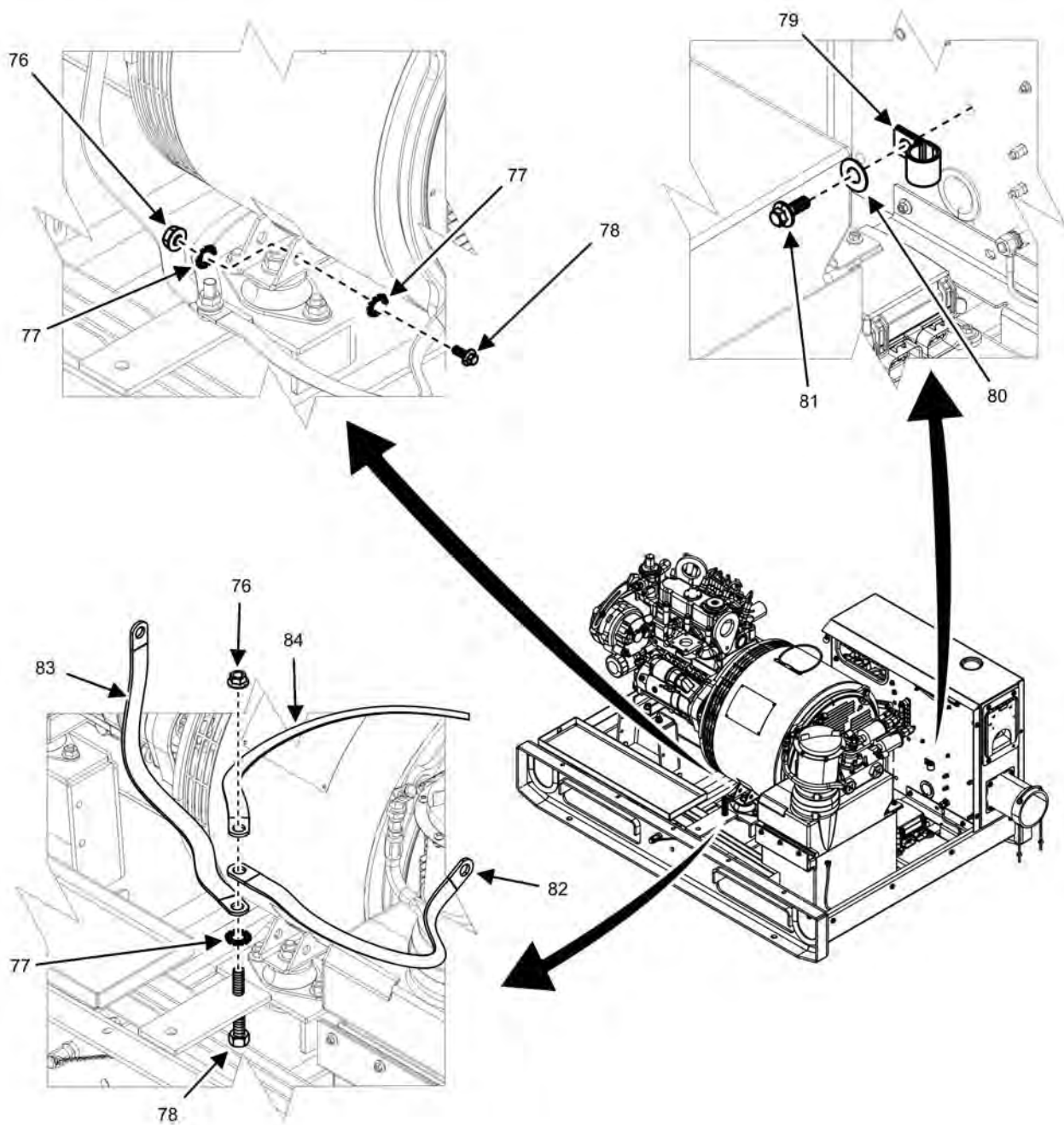


Figure 55. Engine Wiring Harness (Sheet 12 of 16).

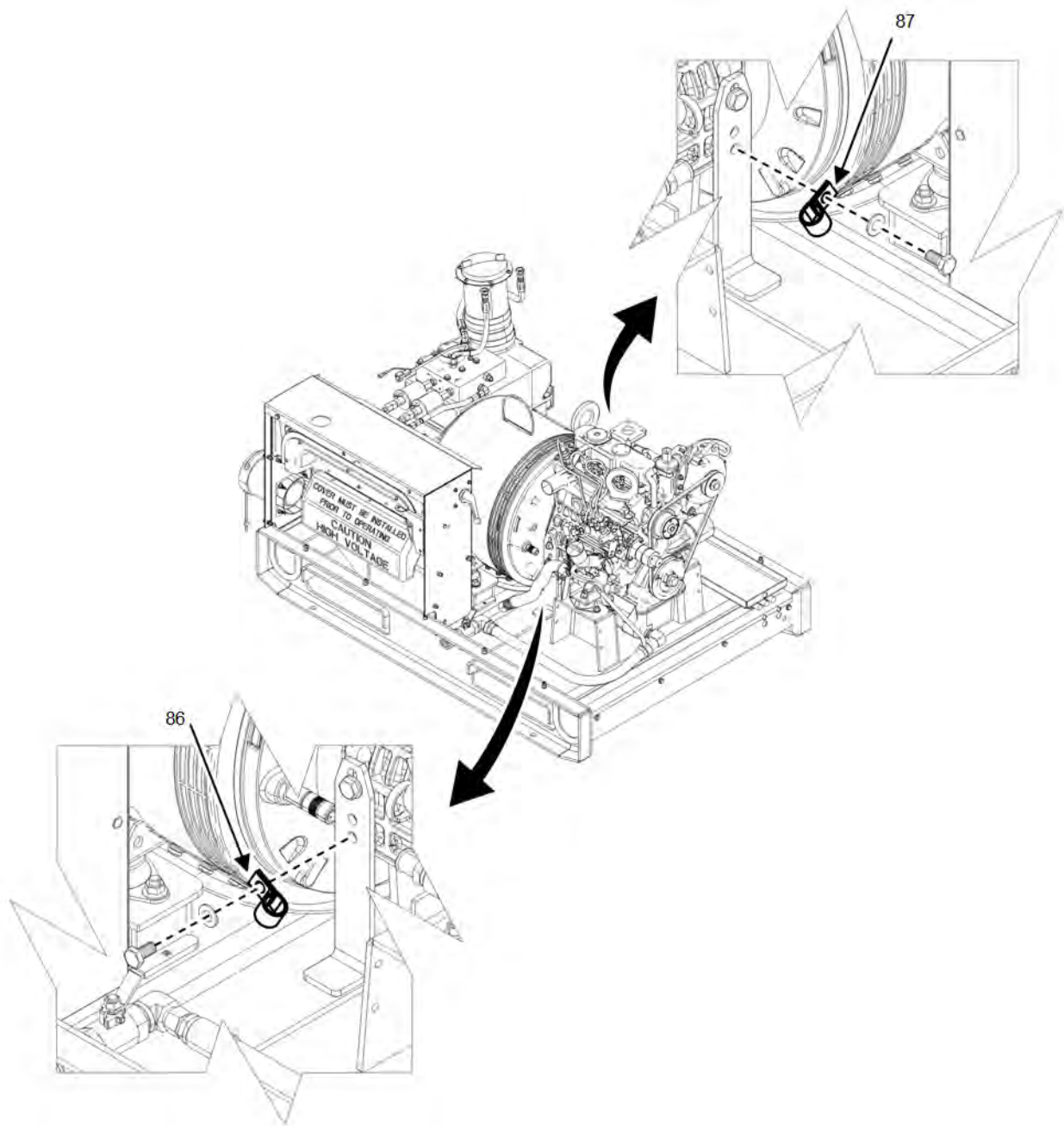


Figure 55. Engine Wiring Harness (Sheet 13 of 16).

WIRE LABEL	FROM	TO
P1-A/P500-25	P1-A	P500-25
P1-C/P500-5	P1-C	P500-5
P1-D/P500-43	P1-D	P500-43
P1-E/P500-3	P1-E	P500-3
P1-G/P500-41	P1-G	P500-41
P1-J/P90-1	P1-J	P90-1
P1-K/P90-2	P1-K	P90-2
P1-L/P5D-A	P1-L	P5D-A
P5D-B/P85-1	P5D-B	P85-1
P5D-G/P85-2	P5D-G	P85-2
P1-M/P5D-H	P1-M	P5D-H
P1-R/P500-21	P1-R	P500-21
P1-S/P500-23	P1-S	P500-23
P1-T/P500-1	P1-T	P500-1
P2-A/P5D-D	P2-A	P5D-D
P2-B/P5D-C	P2-B	P5D-C
P2-C/P5D-F	P2-C	P5D-F
CB201-LOAD/P20A-1	CB201-LOAD	P20A-1
P5B-F/HTR-(+)	P5B-F	HTR-(+)
P2-F/P500-36	P2-F	P500-36
P2-G/P75-1	P2-G	P75-1
P2-H/P60-2	P2-H	P60-2
P2-J/P37-2	P2-J	P37-2
P2-K/P500-6	P2-K	P500-6
P2-L/P5B-G	P2-L	P5B-G
P2-M/P37-1	P2-M	P37-1
P2-N/P65-2	P2-N	P65-2
P2-P/G2-R	P2-P	G2-R
P2-R/P20A-7	P2-R	P20A-7
P2-S/P500-30	P2-S	P500-30
P2-T/P500-37	P2-T	P500-37
P2-U/J20C-1	P2-U	J20C-1

Figure 55. Engine Wiring Harness (Sheet 14 of 16).

WIRE LABEL	FROM	TO
P2-V/P65-1	P2-V	P65-1
P2-W/P500-18	P20-W	P500-18
P2-Y/P75-2	P2-Y	P75-2
P2-Z/P60-1	P2-Z	P60-1
P2-a/P500-46	P2-a	P500-46
P2-d/P5B-H	P2-d	P5B-H
P2-e/P5B-A	P2-e	P5B-A
P2-f/P5B-B	P2-f	P5B-B
P20A-4/P21-1	P20A-4	P21-1
J20C-2/P21-2	J20C-2	P21-2
P20A-2/J20C-4	P20A-2	J20C-4
P3-A/P500-10	P3-A	P500-10
P3-B/P500-8	P3-B	P500-8
P3-C/P500-45	P3-C	P500-45
P3-E/P5-A	P3-E	P5-A
P3-F/P70-A	P3-F	P70-A
P3-G/P70-B	P3-G	P70-B
P3-H/P500-19	P3-H	P500-19
P3-J/P5-C	P3-J	P5-C
P3-M/P500-16	P3-M	P500-16
P3-N/P14-A	P3-N	P14-A
P3-P/P14-B	P3-P	P14-B
P3-R/P14-SHLD	P3-R	P14-SHLD
P3-V/P5A-E	P3-V	P5A-E
P3-X/P5B-E	P3-X	P5B-E
P3-Y/P5C-B	P3-Y	P5C-B
P3-b/P500-9	P3-b	P500-9
P3-c/P500-17	P3-c	P500-17
P3-d/P500-29	P3-d	P500-29
P3-f/P40-B	P3-f	P40-B
P3-g/P40-C	P3-g	P40-C
P3-h/P35-A	P3-h	P35-A

Figure 55. Engine Wiring Harness (Sheet 15 of 16).

WIRE LABEL	FROM	TO
P3-k/P40-A	P3-k	P40-A
P3-m/P500-50	P3-m	P500-50
P3-n/P500-20	P3-n	P500-20
P3-p/P75-4	P3-p	P75-4
P3-q/P35-B	P3-q	P35-B
P3-r/P5-B	P3-r	P5-B
P3-s/P500-40	P3-s	P500-40
P3-u/P75-3	P3-u	P75-3
P3-v/P96-C	P3-v	P96-C
P3-x/P96-B	P3-x	P96-B
P3-AA/P500-26	P3-AA	P500-26
P3-BB/P500-7	P3-BB	P500-7
P3-CC/P500-49	P3-CC	P500-49
P3-DD/P500-34	P3-DD	P500-34
P3-EE/P500-27	P3-EE	P500-27
P3-GG/P500-39	P3-GG	P500-39
P3-LL/P500-38	P3-LL	P500-38
P3-MM/P500-28	P3-MM	P500-28
P5A-F/P96-A	P5A-F	P96-A
P5C-G/P96-D	P5C-G	P96-D
S10-1/P5C-C	S10-1	P5C-C
S10-2/L4-(+)	S10-2	L4-(+)
S10-3/P5C-A	S10-3	P5C-A
P1-SHLD1/P90-SHLD1	P1	P90
P5D-SHLD2/P85-SHLD2	P5D	P85
P1-SHLD3/P5D-SHLD3	P1	P5D
P2-SHLD4/P37-SHLD4	P2	P37
NONE	P3	P40
NONE	P3	P5
NONE/P70-SHLD7	P3	P70

Figure 55. Engine Wiring Harness (Sheet 16 of 16).

(1)	(2)				(3)	(4)	(5)	(6)	(7)
SMR CODE									
a.	b.	c.	d.						
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 10 ENGINE WIRING HARNESS FIGURE 55 ENGINE WIRING HARNESS									
1	PAFFF	PAFFF	PAFFF	PAFFF	6150-01-633-4902	30554	04-20010	. WIRING HARNESS	1
2	XCFFF	XCFFF	XCFFF	XCFFF		30554	04-20480	. . CONNECTOR, 29 PIN	1
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-250-2524	81349	D38999/26 WJ29SN	. . . CONNECTOR, PLUG, ELECTRICAL	1
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-389-7312	81349	M85049/39-25W	. . . CLAMP, CABLE, ELECTRICAL	2
5	XCFFF	XCFFF	XCFFF	XCFFF		30554	04-20479	. . CONNECTOR, 61 PIN	1
6	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-630-9863	30554	04-20479	. . . CONNECTOR, PLUG, ELECTRICAL	1
7	XCFFF	XCFFF	XCFFF	XCFFF		OPCRI	CD389/26W H21SN-BS 23	. . CONNECTOR, 21 PIN	1
8	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-325-0384	81349	D38999/26 WH21SN	. . . CONNECTOR, PLUG, ELECTRICAL	1
9	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-414-2582	81349	M85049/39-23W	. . . BACKSHELL, ELECTRICAL	1
10	XBFZZ	XBFZZ	XBFZZ	XBFZZ		53421	TAG26T6-1 00B	. . LAMINATE, LABEL, COVER	48
11	XBFZZ	XBFZZ	XBFZZ	XBFZZ		53421	TAG3T3-10 0B	. . LAMINATE, LABEL, COVER	6
12	MFFZZ	MFFZZ	MFFZZ	MFFZZ		3SXL3	04-20013	. . INSULATION SLEEVING, (MAKE FROM 55PP02872757640064 ON BULK ITEMS LIST CUT TO LENGTH AS REQUIRED)	1
13	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-479-1823	45152	6HB683	. . PLUG, END SEAL, ELECTRICAL	17
14	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5999-01-572-2092	11139	1062-20-01 22	. . CONTACT, ELECTRICAL, 22-16 AWG	33
15	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-588-5256	30554	04-20598	. . CONNECTOR, PLUG, HOUSING, 50 PIN	1
16	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-20448	. . STRAND, WIRE, 16 AWG, (MAKE FROM P/N 3271-16-26 ON BULK ITEMS LIST, CUT TO LENGTH AS NEEDED)	1
17	MFFZZ	MFFZZ	MFFZZ	MFFZZ		0X4C9	04-20901	. . STRAND, WIRE, 20 AWG, (MAKE FROM 3271-20-10 ON BULK ITEMS LIST CUT TO LENGTH AS REQUIRED)	1

(1) ITEM NO.	(2) SMR CODE				(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
18	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-587-7612	44940	04-20597	.. CONNECTOR, PLUG, ELECTRICAL, 50 PIN	1
19	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-00-143-4771	81343	MS25036-1 03	.. TERMINAL, LUG, 16-14 AWG	4
20	MFFZZ	MFFZZ	MFFZZ	MFFZZ		92194	04-21713	.. INSULATION SLEEVING, ELECTRI- CAL, (MAKE FROM TFT-250-16 ON BULK ITEMS LIST CUT TO LENGTH AS REQUIRED)	1
21	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-470-8342	11139	W3S	.. POLARIZING KEY, ELECTRICAL	1
22	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5999-01-556-4351	4RWU5	1062-16-06 22	.. CONTACT, ELECTRICAL, 22-16 AWG	22
23	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-523-8855	30554	04-20521	.. CONNECTOR, PLUG, ELECTRICAL, 3 PIN	1
24	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-01-112-9746	30554	88-20275-1	.. TERMINAL, DISCONNECT	2
25	MFFZZ	MFFZZ	MFFZZ	MFFZZ	5970-01-470-1630	30554	88-20541-9	.. INSULATION SLEEVING, ELECTRI- CAL, (MAKE FROM 88-20541 ON BULK ITEMS LIST CUT TO LENGTH AS REQUIRED)	1
26	XBFZZ	XBFZZ	XBFZZ	XBFZZ		53421	TAG9T3-10 0B	.. LAMINATE, LABEL COVER	26
27	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-447-5814	11139	DT06-2S	.. CONNECTOR, BODY, PLUG, 2 PIN ...	4
28	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-446-8180	11139	W2S	.. CONNECTOR, BODY, PLUG, WEDGE 2 PIN	4
29	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5999-01-323-4929	77060	12034051	.. CONTACT, ELECTRICAL, 18-20 AWG	4
30	PCFZZ	PCFZZ	PCFZZ	PCFZZ	5340-01-586-8449	77060	15324982	.. BOOT, DUST AND MOISTURE	19
31	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-308-8599	45152	1788880	.. CONNECTOR, BODY, PLUG, 4 PIN ...	1
32	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-569-9460	71400	32006-A22	.. CONNECTOR, PLUG, BLACK ELEC- TRICAL	1
33	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-339-9574	77060	12010300	.. PLUG, END SEAL, ELECTRICAL	13
34	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-570-4538	71400	32006-TP2	.. CONNECTOR BODY, MODULAR	4
35	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-01-527-3588	77060	12077411	.. TERMINAL, QUICK DISCONNECT	19
36	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-588-5261	1UW16	32006-B22	.. CONNECTOR, PLUG, GRAY ELEC- TRICAL	1
37	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-569-9470	71400	32006-D22	.. CONNECTOR, PLUG, BLUE ELEC- TRICAL	1
38	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-01-126-3973	30554	88-20275-2	.. TERMINAL, DISCONNECT	1
39	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5975-01-360-4293	77060	12015899	.. SEAL	4

(1) ITEM NO.	(2) SMR CODE				(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
40	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-20547	.. CABLE, SPECIAL PURPOSE, 18 AWG, (MAKE FROM EF20C0028722 ON BULK ITEMS LIST CUT TO LENGTH AS REQUIRED)	1
41	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-569-9542	71400	32006-C22	.. CONNECTOR, PLUG, GREEN ELEC- TRICAL	1
42	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	88-20541-11	.. INSULATION, SLEEVING, (MAKE FROM 88-20541-11 ON BULK ITEMS LIST CUT TO LENGTH AS REQUIRED)	1
43	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-00-143-4471	81343	MS2503-103	.. TERMINAL, LUG, RING, 22-18 AWG ..	3
44	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-506-5555	0FW39	12422624	.. CONNECTOR, PLUG, ELECTRICAL ..	1
45	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5999-01-590-5769	11139	1060-16-06 22	.. CONTACT, ELECTRICAL, 16-20 AWG ..	2
46	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-519-1808	11139	04-20523	.. RETAINER, ELECTRICAL	1
47	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30553	04-20491	.. CABLE, ELECTRICAL, 18 AWG), (MAKE FROM EF20C0038722 ON BULK ITEMS LIST CUT TO LENGTH AS REQUIRED)	1
48	PCFZZ	PCFZZ	PCFZZ	PCFZZ	5340-01-589-1081	30554	04-20468	.. SEAL	3
49	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-585-9802	30554	04-20469	.. CONNECTOR, RECEPTACLE	1
50	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5999-01-587-6962	30554	12191818	.. CONTACT, PIN, 20-22 AWG	3
51	PCFZZ	PCFZZ	PCFZZ	PCFZZ	5930-01-587-6626	44940	04-20962	.. BOOT, DUST AND MOISTURE	2
52	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5999-01-582-1957	77060	12089290	.. TERMINAL, QUICK DISCONNECT	3
53	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-503-3305	77060	12065287	.. CONNECTOR BODY, PLUG	1
54	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-00-283-5281	81343	MS25036-1 09	.. TERMINAL, LUG	1
55	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5999-01-588-5530	44940	04-20628	.. CONTACT, SOCKET	2
56	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-466-0260	77060	12162193	.. CONNECTOR, PLUG, ELECTRICAL ..	1
57	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-01-586-0213	30554	88-20275-3	.. TERMINAL, DISCONNECT	1
58	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-00-464-0117	00779	36152	.. TERMINAL, LUG	4
59	PAFZZ	PAFZZ	PAFZZ	PAFZZ			M85049/38 C-4A	.. CLAMP	1
60	PCFZZ	PCFZZ	PCFZZ	PCFZZ	5365-00-598-5282	96906	MS3420-4	.. BUSHING, RUBBER	1
61	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-590-5546	77820	97-3106A-10 SL-4S(624)	.. CONNECTOR, ELECTRICAL MAG- NETIC SENSOR	1
62	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-540-8655	45152	2KP504	.. SEAL, PLAIN	2
63	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-01-560-0703	00779	929939-1	.. TERMINAL, LUG, 16-20 AWG	2

(1) ITEM NO.	(2) SMR CODE				(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
64	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-558-4762	00779	963040-3	. . CONNECTOR BODY, PLUG	1
65	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-588-6862	30554	04-20474	. . CAP, CONNECTOR	1
66	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-174-1235	30554	04-20703	. . CONNECTOR, PLUG, ELECTRICAL ..	7
67	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5395-01-484-6537	30554	04-20472	. . CONNECTOR, PLUG, ELECTRICAL ..	1
68	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-483-0852	30554	04-20526	. . CONNECTOR, RECEPTACLE	1
69	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-523-5410	11139	DT04-4P-E P13	. . CONNECTOR, PLUG, ELECTRICAL ..	1
70	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-620-0446	11139	1011-348-0 805	. . CONNECTOR, RECEPTACLE	1
71	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-523-1411	11139	W8S	. . RETAINER, ELECTRICAL	1
72	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-587-7601	11139	DT06-08SA	. . CONNECTOR, PLUG, ELECTRICAL ..	1
73	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-620-0621	11139	1011-347-0 605	. . CONNECTOR, RECEPTACLE	1
74	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-515-2283	19207	12485651-1 25	. . SECONDARY LOCKNUT	1
75	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-539-9272	45152	2HB188	. . CONNECTOR, PLUG, ELECTRICAL ..	1
76	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-641-5050	D8286	DIN6923-M 10	. NUT, PLAIN, EXTENDED	2
77	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-596-3741	05047	AEW13X375 000GD5A21	. WASHER, 3/8, EXT TOOTH	3
78	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-592-8054	05047	AES10M10C 030WB4K42	. SCREW, HEX HEAD, M10	2
79	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-00-053-8994	80205	MS21333-1 26	. CLAMP, LOOP	1
80	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-01-562-6014	62319	DIN-9021-M 6	. WASHER, FLAT, M6	1
81	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-592-1168	05047	AES10M06A 020WB4K42	. SCREW, CAP, HEX, M6	1
82	PAFZZ	PAFZZ	PAFZZ	PAFZZ	6145-01-588-6588	30554	04-21116-1	. STRAP, GROUNDING	1
83	PAFZZ	PAFZZ	PAFZZ	PAFZZ	6145-01-588-6398	5T0Q1	EM4A080	. STRAP, GROUNDING	1
84	PAFZZ	PAFZZ	PAFZZ	PAFZZ	6145-01-588-6563	30554	04-21116-5	. STRAP, GROUNDING	1
85	XBFZZ	XBFZZ	XBFZZ	XBFZZ		53421	TAG38T4-1 00B	. LAMINATE, LABEL COVER	2
86	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-586-8472	75272	COV-0813	. CLAMP, LOOP	1

(1)	(2)				(3)	(4)	(5)	(6)	(7)
SMR CODE									
	a.	b.	c.	d.					
ITEM	AIR					PART		DESCRIPTION AND	
NO.	ARMY	FORCE	NAVY	USMC	NSN	CAGEC	NUMBER	USABLE ON CODE (UOC)	QTY
87	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-158-2136	75272	COV-1413	. CLAMP, LOOP	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 11 POWER WIRING HARNESS REPAIR PARTS LIST

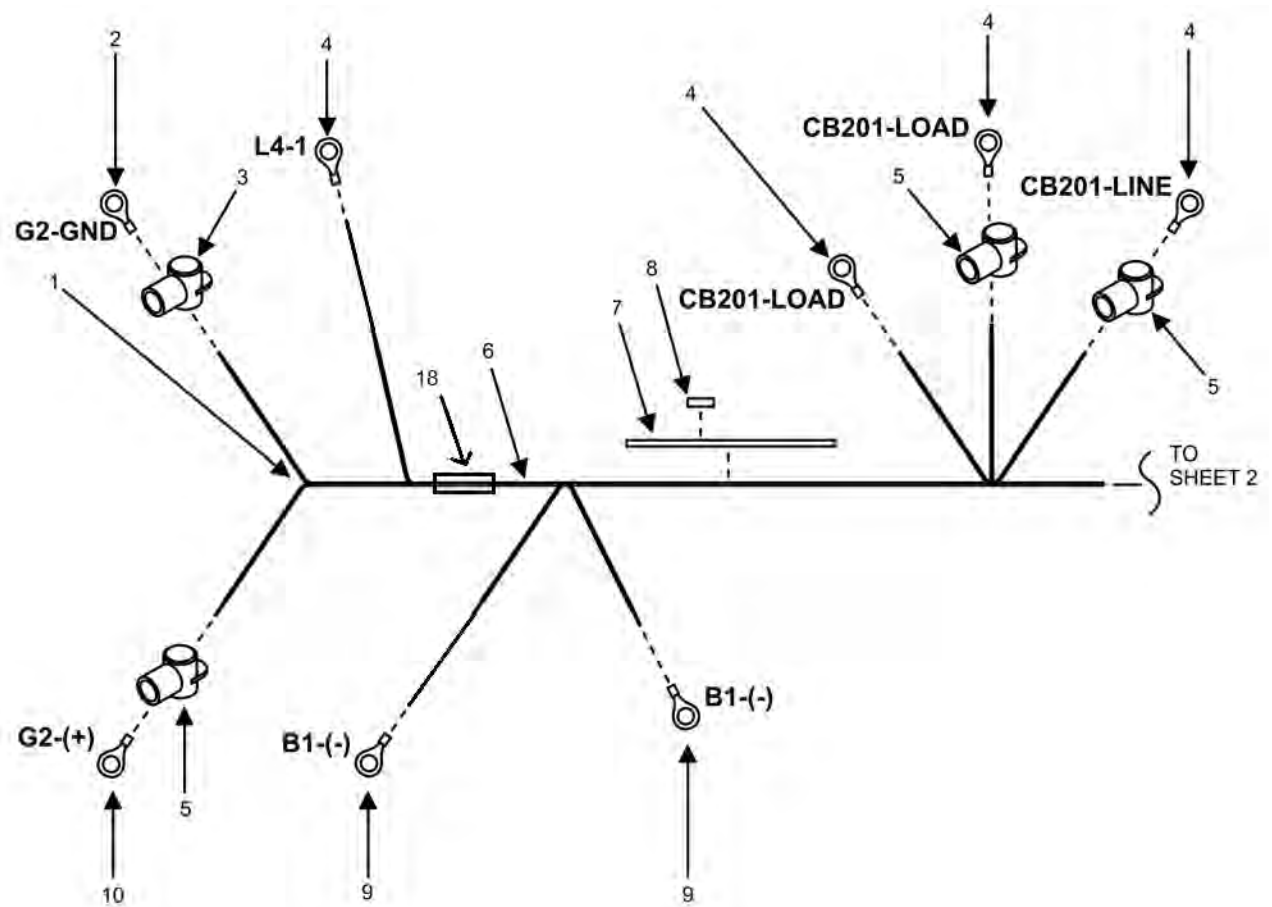
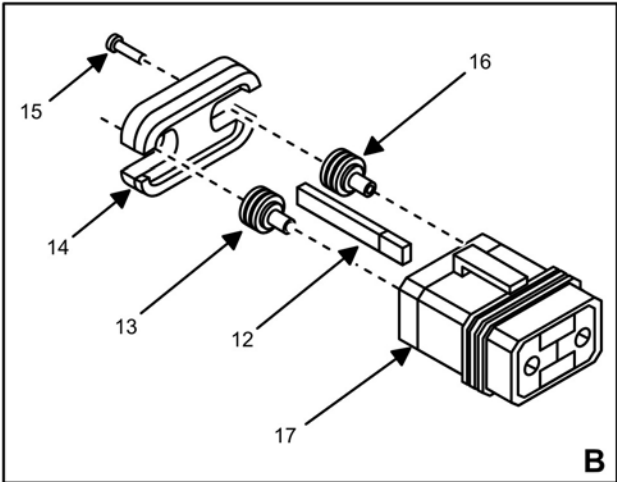
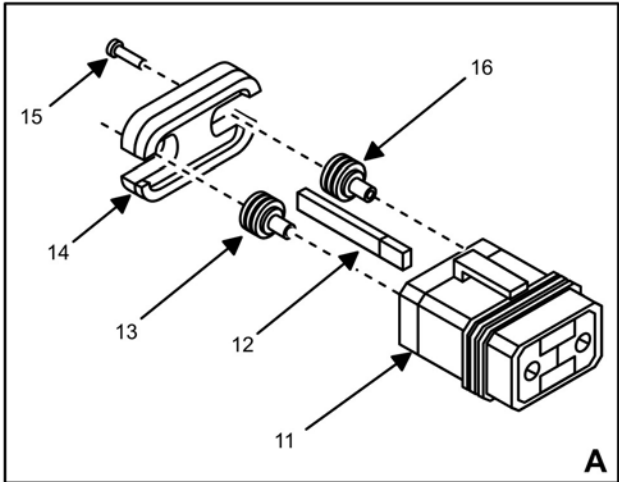
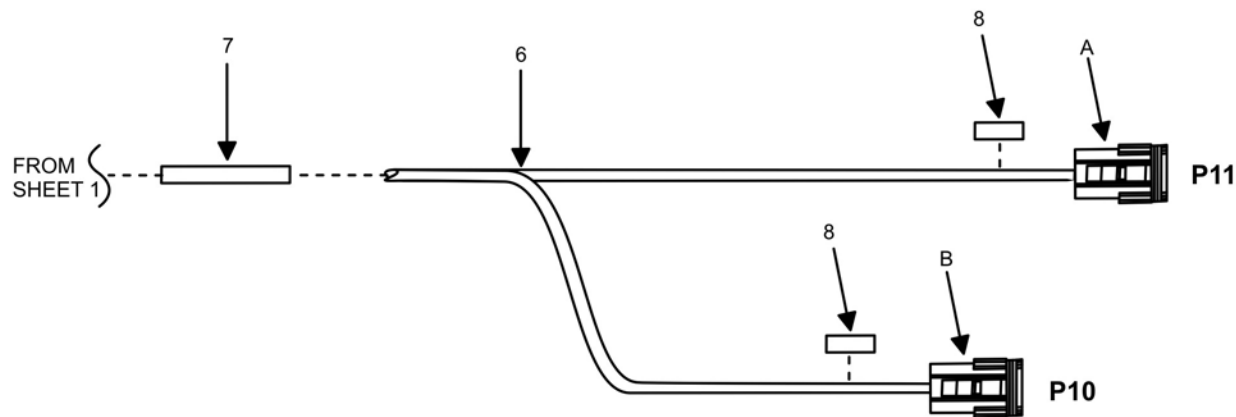


Figure 56. Power Wiring Harness (Sheet 1 of 2).



WIRE LABEL	FROM	TO
P10-1/CB201-LOAD	P10-1	CB201-LOAD
P11-1/B1-(-)	P11-1	B1-(-)
CB201-LINE/L4-1	CB201-LINE	L4-1
G2-(+)/CB201-LOAD	G2-(+)	CB201-LOAD
B1-(-)/G2-GND	B1-(-)	G2-GND

Figure 56. Power Wiring Harness (Sheet 2 of 2).

(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 11 POWER WIRING HARNESS FIGURE 56 POWER WIRING HARNESS									
1	PAFFF	PAFFF	PAFFF	PAFFF	6150-01-633-3801	30554	04-21080	. WIRING HARNESS, POWER	1
2	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-00-143-4794	81343	MS25036-1 12	. . TERMINAL, LUG, RING	1
3	PCFZZ	PCFZZ	PCFZZ	PCFZZ	5340-01-621-0245	30554	04-20962-6	. . BOOT, DUST AND MOISTURE (BLACK)	1
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-00-718-9913	00779	35111	. . TERMINAL, LUG, RING, M8, 12-10 AWG	4
5	PCFZZ	PCFZZ	PCFZZ	PCFZZ	5930-01-587-6626	7Z043	218N1T02	. . BOOT, DUST AND MOISTURE (RED)	3
6	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-21051-1	. . STRAND, WIRE, 10 AWG, (MAKE FROM 04-20575 ON BULK ITEMS LIST CUT TO LENGTH AS NEEDED)	1
7	MFFZZ	MFFZZ	MFFZZ	MFFZZ		3SXL3	04-20013	. . INSULATION SLEEVING, (MAKE FROM EY-1877 ON BULK ITEMS LIST CUT TO LENGTH AS NEEDED)	1
8	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-20556	. . LAMINATE, LABEL COVER	1
9	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-00-823-1581	00779	35112	. . TERMINAL, LUG, RING, 3/8 IN, 12-10 AWG	2
10	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-00-143-4777	81343	AS25036-1 57	. . TERMINAL, LUG, RING	1
11	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-569-9506	71400	32004-A2	. . CONNECTOR, PLUG, ELECTRICAL (BLACK)	1
12	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5940-01-570-0849	45152	17KP739	. . TERMINAL, TAPER, RECEPTACLE ...	2
13	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-617-6406	IV6F3	12129381	. . BOOT, DUST AND MOISTURE SEAL	2
14	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-570-4557	71400	32004-TP2	. . CONNECTOR BODY, RECEPTACLE COVER	2
15	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-191-7772	11139	114018	. . PLUG, PROTECTIVE, DUST AND MOISTURE SEAL	2
16	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-570-3453	71400	04-21820	. . SEAL	2
17	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5935-01-592-8518	1UW16	32004-B2	. . CONNECTOR, PLUG, ELECTRICAL (GRAY)	1
18	PAFZZ	PAFZZ	PAFZZ	PAFZZ		53421	TAG3T3-10 0B	. . LAMINATE, LABEL COVER	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
GROUP 12 WINTERIZATION KIT REPAIR PARTS LIST

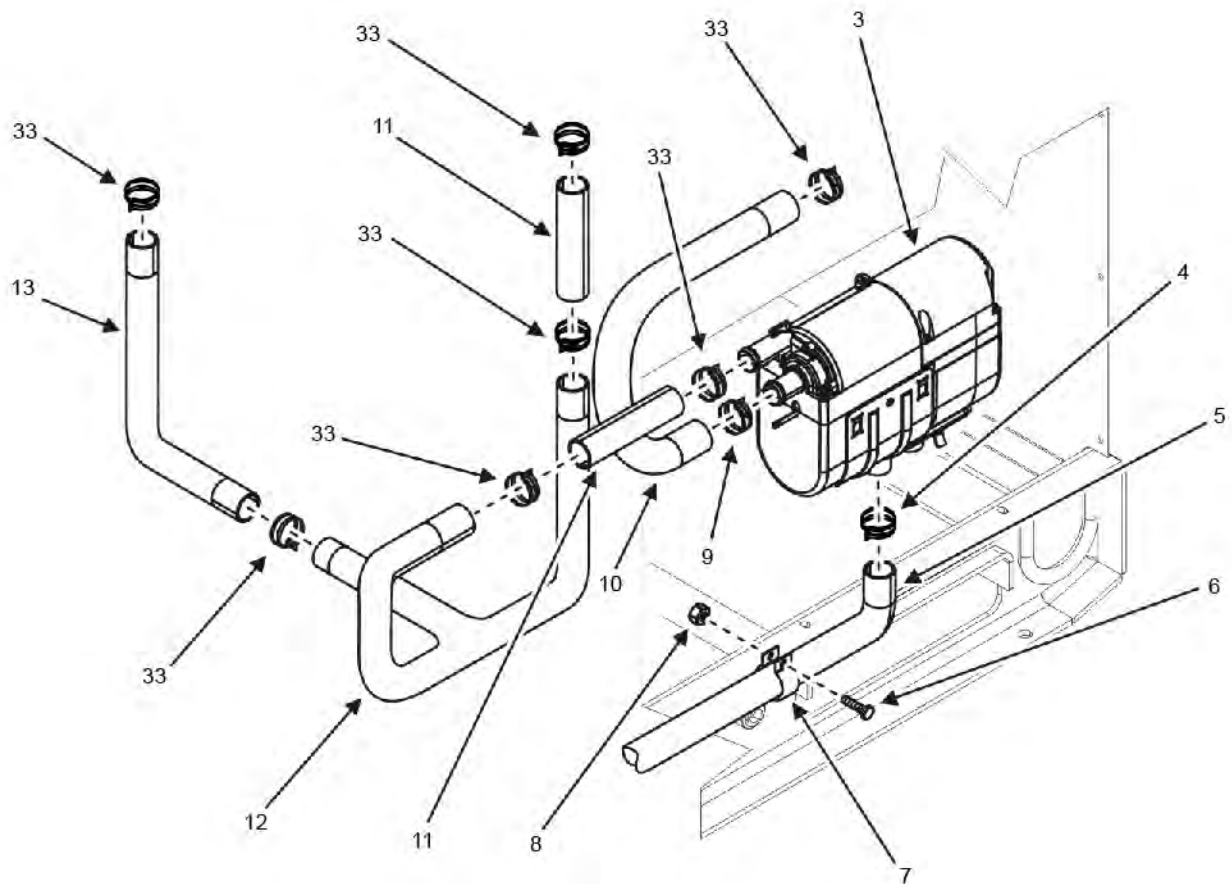


Figure 57. Winterization Kit (Sheet 1 of 4).

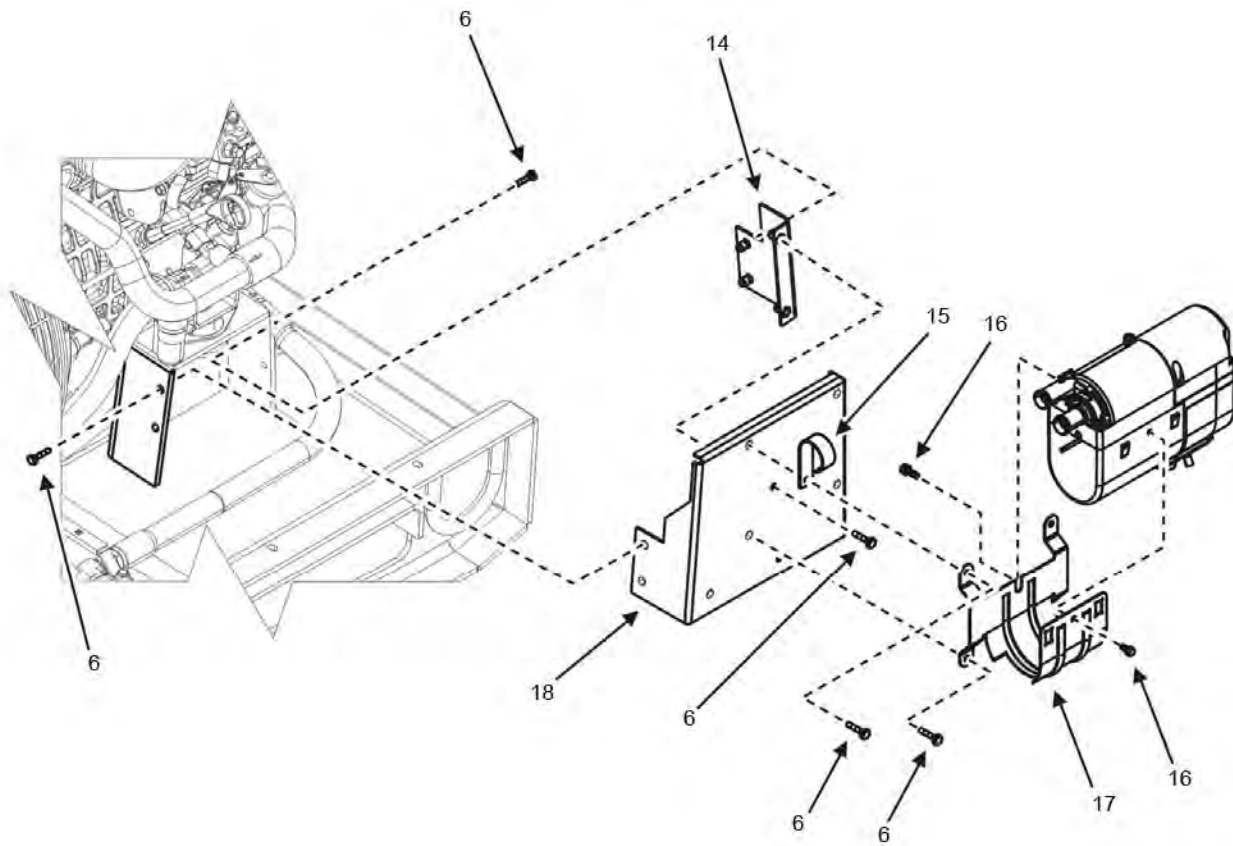


Figure 57. Winterization Kit (Sheet 2 of 4).

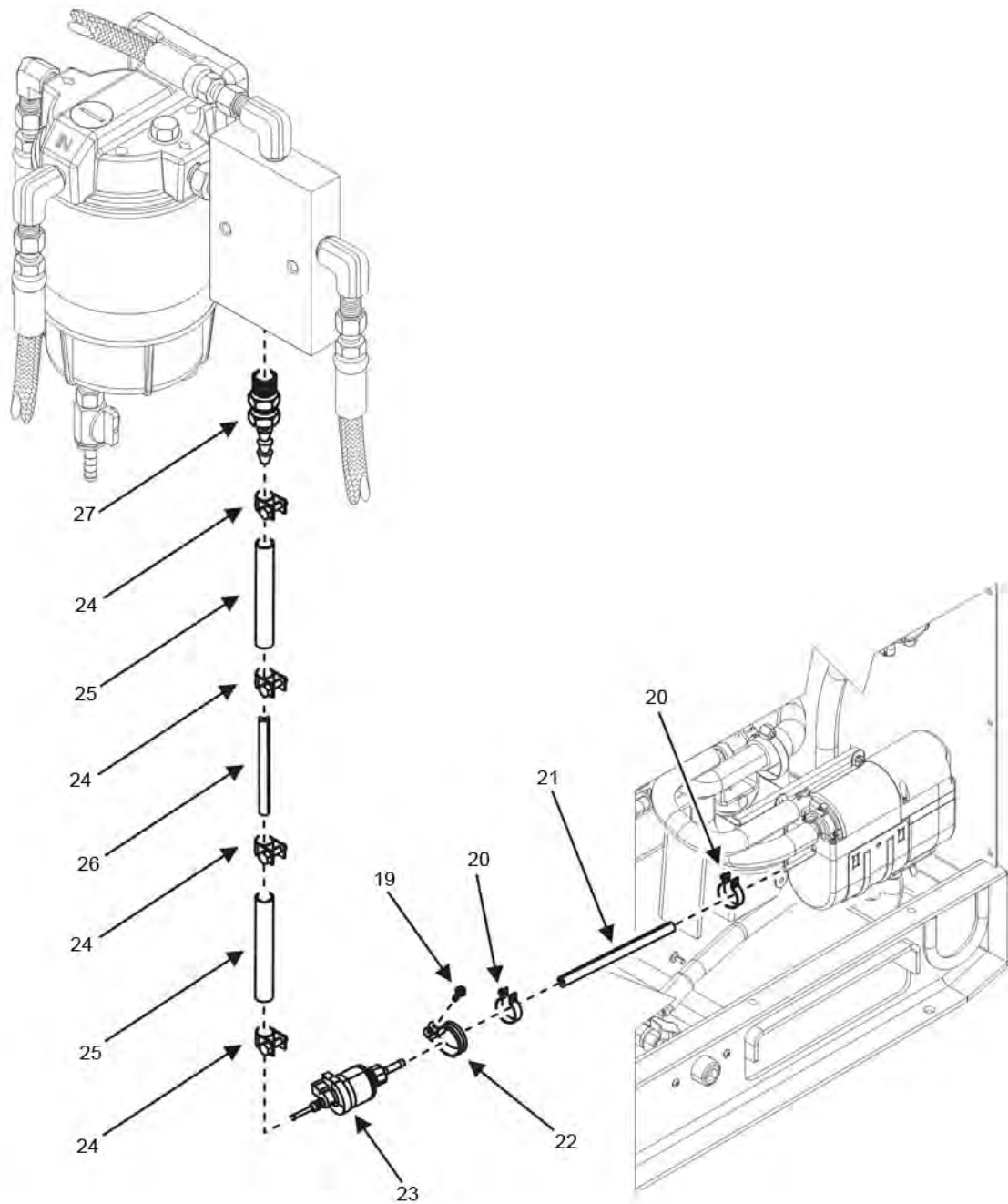


Figure 57. Winterization Kit (Sheet 3 of 4).

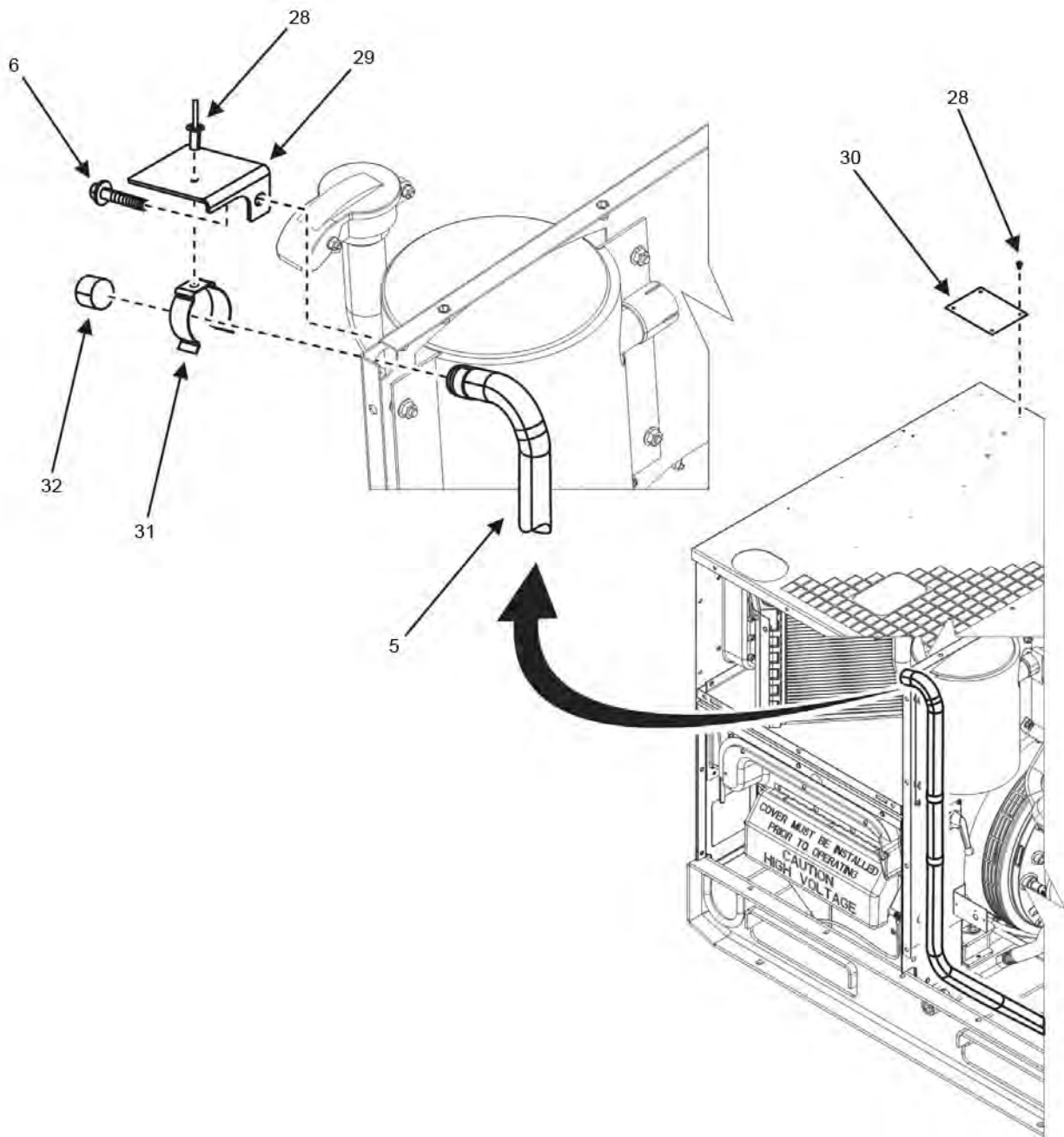


Figure 57. Winterization Kit (Sheet 4 of 4).

(1)	(2)				(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE				NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
GROUP 12 WINTERIZATION KIT FIGURE 57 WINTERIZATION KIT									
1	KFFFF	KFFFF	KFFFF	KFFFF	6115-01-589-2624	30554	04-21670	. WINTERIZATION KIT, GENERATOR SET (NOT SHOWN)	1
2	KFFFF	KFFFF	KFFFF	KFFFF		30554	04-20775	. . KIT, WINTERIZATION (NOT SHOWN)	7
3	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2910-01-632-3021	38453	99-20-0019	. . HEATER	1
4	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-20-006-2750	30554	04-21221	. . CLAMP, TUBE 30 MM ID	1
5	XBFZZ	XBFZZ	XBFZZ	XBFZZ	5305-01-596-3670	30554	AES10M06A 016WB4K42	. . TUBE, FLEXIBLE EXHAUST	1
6	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-596-3670	30554	AES10M06A 016WB4K42	. . SCREW, HEX FLANGE HEAD M6X1X16	11
7	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-00-051-2672	96906	MS9025-17	. . CLAMP, TUBE	2
8	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5310-33-208-2057	D8286	DIN6923-M6	. . NUT, HEX FLANGE M6X1	1
9	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-418-0208	81343	SAE J1508 CTB-29	. . CLAMP TYPE CBT	7
10	PCFZZ	PCFZZ	PCFZZ	PCFZZ	4720-01-597-9419	30554	04-21175	. . HOSE,COOLANT	1
11	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-21208-3	. . HOSE, NONMETALLIC 3/4 IN ID, (MAKE FROM 04-20200 ON BULK ITEMS LIST CUT TO LENGTH 85±10 MM)	2
12	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4710-01-597-5163	30554	04-21386	. . TUBE, HEATER 5KW	1
13	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-21208-4	. . HOSE, NONMETALLIC 3/4 IN ID, (MAKE FROM 04-20200 ON BULK ITEMS LIST CUT TO LENGTH 353±10 MM)	1
14	XBFZZ	XBFZZ	XBFZZ	XBFZZ	5340-01-631-0430	30554	CJV1709Z1	. . BRACKET,HEATER	1
15	PAFZZ	PAFZZ	PAFZZ	PAFZZ		30554	04-21431-3	. . CLAMP, J	1
16	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-596-3667	05047	AES10M06A 012WB4K42	. . SCREW, HEX FLANGE HEAD M6X1X12	2
17	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21205	. . BRACKET, HEATER	1
18	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-20774	. . BRACKET, HEATER 5KW	1
19	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5305-01-598-0197	05047	AES10M06A 030WB4K42	. . SCREW, HEX FLANGE HEAD M6X1X30	1
20	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-596-7041	81343	SAEJ1508D 9	. . CLAMP, HOSE	2

(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
21	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-20852-1	.. HOSE, FUEL 5/32 IN ID, (MAKE FROM 04-20851 ON BULK ITEMS LIST CUT TO LENGTH 290±10 MM)	1
22	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-592-9423	44940	04-21215	.. CLAMP, LOOP	1
23	PAFZZ	PAFZZ	PAFZZ	PAFZZ	2910-20-002-7185	1C645	25-1942-45 0000	.. PUMP, FUEL, WINTERIZATION KIT ...	1
24	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-596-5173	81343	SAEJ1508D 11	.. CLAMP, HOSE	4
25	PCFZZ	PCFZZ	PCFZZ	PCFZZ	4720-20-005-9979	38453	40-10-0017	.. HOSE, FUEL, 5MM ID	2
26	MFFZZ	MFFZZ	MFFZZ	MFFZZ		30554	04-21547-3	.. TUBE, FLEXIBLE, (MAKE FROM 04-20462 ON BULK ITEMS LIST CUT TO LENGTH 950±10 MM)	1
27	XBFZZ	XBFZZ	XBFZZ	XBFZZ	4730-01-449-1233	93061	125HB-3-4	.. ADAPTER, HOSE, 0.25 IN NPT MALE TO BARB	1
28	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5320-00-932-1972	81349	M24243/6-A 402H	.. RIVET, BLIND	5
29	XBFZZ	XBFZZ	XBFZZ	XBFZZ		30554	04-21503	.. BRACKET, EXHAUST TUBE	1
30	PAFZZ	PAFZZ	PAFZZ	PAFZZ	7690-01-596-5339	30554	04-21676	.. PLATE, OPERATING INSTRUCTIONS	1
31	PAFZZ	PAFZZ	PAFZZ	PAFZZ	5340-01-588-3558	78553	C22275-02 0-4	.. CLIP	1
32	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-20-006-4607	30554	04-21219	.. CAP, TUBE	1
33	PAFZZ	PAFZZ	PAFZZ	PAFZZ	4730-01-596-7215	81343	SAEJ1508C TB-27	.. CLAMP, HOSE	7
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE

GROUP 99 BULK ITEMS

(1)	(2)				(3)	(4)	(5)	(6)	(7)
	SMR CODE								
	a.	b.	c.	d.					
ITEM NO.	ARMY	AIR FORCE	NAVY	USMC	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 99 BULK MATERIAL FIG. BULK									
1	PAFZZ				6145-01-588-6850	30554	EF20C0038 722	CABLE, ELECTRICAL	1
2	PAFZZ				6145-01-252-1449	16428	89418	CABLE, POWER, ELECTRICAL	1
3	PAFZZ				6150-01-599-2923	16428	9514	CABLE, SHIELDED	1
4	PAFZZ				6150-01-599-2925	16428	9512	CABLE, SHIELDED	1
5	PAFZZ					30554	09130SWC8	CABLE, SHIELDED	1
6	PAFZZ				6145-01-624-3795	30554	EF20C0028 722	CABLE, SPECIAL, PURPOSE	1
7	PAFZZ				9150-20-004-4776	13160	846-1p	COATING	1
8	PCFZZ				5330-01-589-6527	C4643	A2539	EDGING	1
9	PCFZZ				5330-01-589-6559	C4643	04-20249	EDGING	1
10	PCFZZ				4720-01-596-5240	24161	4219-0109	HOSE, FUEL	1
11	PCFZZ				4720-01-479-2748	45152	3058529	HOSE, NONMETALLIC	1
12	PCFZZ				4720-01-594-2216	44940	04-20577	HOSE, NONMETALLIC	1
13	PCFZZ				4720-20-006-0172	38453	30-10-0003	HOSE, NONMETALLIC	1
14	PCFZZ				4720-20-006-1632	38453	40-10-0005	HOSE, NONMETALLIC	1
15	PCFZZ				4720-20-005-9980	38453	40-10-0016	HOSE, NONMETALLIC	1
16	PAFZZ				5970-01-531-5648	30554	88-20541-1	INSULATION SLEEVING	1
17	PAFZZ				5970-01-470-1630	30554	88-20541-9	INSULATION SLEEVING	1
18	PAFZZ				5970-01-631-2564	30554	88-20541-11	INSULATION SLEEVING	1
19	PAFZZ				5970-01-531-5648	30554	88-20541-14	INSULATION SLEEVING	1
20	PAFZZ				5970-01-593-1916	3SXL3	55PP028727 57640064	INSULATION SLEEVING	1
21	PAFZZ				5970-01-326-1733	92194	TFT-250-16	INSULATION SLEEVING, ELECTRICAL	1
22	PAFZZ				4720-01-208-5869	24161	4230-0134	HOSE, NONMETALLIC	1
23	PAFZZ				8030-00-082-2508	81346	ASTM D53 63	PRIMER, SEALING, COMPOUND	1
24	PCFZZ				9390-12-382-7191	C4643	A1512	SEAL, EDGE	1
25	PCFZZ				5330-12-382-6622	C4643	A3709	SEAL, EDGE	1

(1) ITEM NO.	(2) SMR CODE				(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
	a. ARMY	b. AIR FORCE	c. NAVY	d. USMC					
26	PCFZZ				5330-12-382-6625	C4643	A3921	SEAL, EDGE, BULB	1
27	PCFZZ				5330-12-382-6625	C4643	A3921	SEAL, EDGE	1
28	PAFZZ				8030-01-479-0487	05972	56541	SEALING COMPOUND	1
29	PAFZZ				8030-01-396-3362	05972	68035	SEALING COMPOUND	1
30	PAFZZ				8040-01-643-2960	44940	MIL-S-4616 3A	SEALING COMPOUND	1
31	PCFZZ				4720-01-487-3507	85901	ATUM-24/6 -0	SLEEVE, HEAT SHRINK	1
32	PCFZZ				5970-01-471-3258	30554	88-20541-15	SLEEVING, INSULATION	1
33	PAFZZ				4010-01-592-8570	30554	3271-12-65	STRAND, WIRE	1
34	PAFZZ				4010-01-594-2186	0X4C9	3271-14-41	STRAND, WIRE	1
35	PAFZZ				4010-01-590-6749	44940	3271-16-26	STRAND, WIRE	1
36	PAFZZ				4010-01-592-8567	0X4C9	3271-20-10	STRAND, WIRE	1
37	PAFZZ				4010-01-596-0040	30554	327-6-133	STRAND, WIRE	1
38	PAFZZ				4010-01-593-4805	0X4C9	3271-8-133	STRAND, WIRE	1
39	PAFZZ				4010-01-596-5308	30554	04-20575	STRAND, WIRE	1
40	PAFZZ				6154-01-596-4356	44940	13230E665 1-24	WIRE, BRAIDED	1
END OF FIGURE									

FIELD AND SUSTAINMENT MAINTENANCE
SPECIAL TOOLS LIST

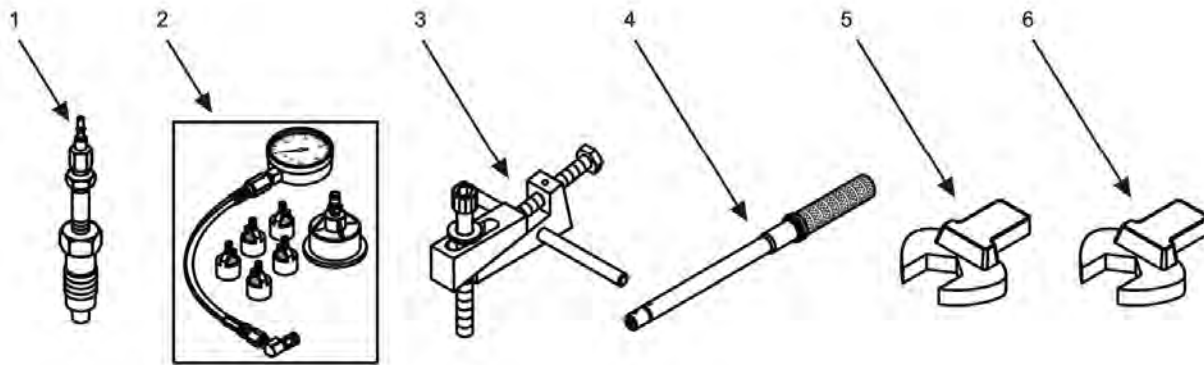


Figure 58. Special Tools List.

(1)		(2)				(3)	(4)	(5)	(6)	(7)
		SMR CODE								
		a.	b.	c.	d.					
ITEM		AIR					PART		DESCRIPTION AND	
NO.	ARMY	FORCE	NAVY	USMC	NSN	CAGEC	NUMBER		USABLE ON CODE (UOC)	QTY
SPECIAL TOOLS LIST										
FIGURE 58 SPECIAL TOOLS LIST										
1	PAFZZ				4910-01-604-2735	0J1H4	KUB5ENG OMAD		ADAPTER, COMPRESSION TEST	
	KFFZZ					0J1H4	5-10-15STT EKIT		KIT, AMMPS 5, 10, 15 KW STTE (NOT SHOWN)	
	KFFZZ					0J1H4	5-60STTEK IT		KIT, AMMPS COMMON STTE (NOT SHOWN)	
2	PAFZZ				6685-01-604-2696	47M91	3289		TEST SET, OIL SYSTEMS PRESSURE .	
3	PAFZZ				4910-01-605-6009	0J1H4	01METRIC		TOOL, RIVET NUT	
4	PAFZZ				5120-01-603-9678	636D0	64-154		TORQUE TUBE, 5-75 FT•LB	
5	PAFZZ				5120-01-603-9692	636D0	64-309		TORQUE WRENCH HEAD END, 1/4 X 3/8 IN DRIVE, 5/8 IN	
6	PAFZZ				5120-01-603-9691	636D0	64-308		TORQUE WRENCH HEAD END, 1/4 X 3/8 IN DRIVE, 9/16 IN	
END OF FIGURE										

FIELD AND SUSTAINMENT MAINTENANCE

NSN INDEX

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
3110-00-004-1405	24	20	4730-01-017-5119	31	15
4720-00-021-3320	1	31	5310-01-049-2745	23	27
5340-00-051-2672	57	7		24	19
5340-00-053-8994	55	79	5310-01-051-8089	23	26
8030-00-082-2508	BULK	23		24	18
5310-00-087-4652	22	1	5310-01-060-7181	23	32
4730-00-113-0567	11	41		24	24
5940-00-113-9828	11	12	5310-01-060-9104	23	20
	4	41	5305-01-062-3344	24	27
5940-00-114-1315	15	8	5310-01-077-9650	23	8
2590-00-141-9758	11	8		24	35
5940-00-143-4471	55	43	5310-01-080-0030	4	37
5940-00-143-4771	55	19	5975-01-096-3170	13	13
5940-00-143-4777	56	10	5935-01-097-9974	2	18
5940-00-143-4794	56	2	4730-01-109-7901	23	17
5940-00-143-5573	15	12	5940-01-112-9746	55	24
5325-00-185-0001	10	20	5940-01-126-3973	55	38
5310-00-189-8467	16	12	5940-01-139-0853	19	34
5935-00-221-8620	6	7	5340-01-158-2136	55	87
4730-00-278-3722	13	10	5940-01-158-9913	11	15
5940-00-283-5281	55	54	3110-01-160-9663	23	28
5940-00-464-0117	1	40	5310-01-164-8542	11	45
	21	13	5310-01-168-8140	2	16
	55	58		35	12
5310-00-480-8509	23	35	5935-01-174-1235	18	11
5940-00-504-5877	15	15		21	7
	17	32		55	66
4730-00-595-1078	10	16	5305-01-174-2761	23	19
5365-00-598-5282	55	60	5310-01-174-2761	24	14
5930-00-615-6731	6	8	5935-01-184-7188	6	1
5940-00-617-2896	17	38	5305-01-190-4461	23	33
	23	14		24	23
	24	4	5340-01-191-7772	56	15
4730-00-639-9730	26	1	4720-01-208-5869	BULK	22
5940-00-655-3318	17	23	4730-01-208-9235	12	6
5940-00-660-3633	19	37	4730-01-242-4510	12	7
	21	16	5935-01-250-2524	55	3
5930-00-683-1625	2	22	6145-01-252-1449	BULK	2
5940-00-718-9913	56	4	2910-01-275-1749	11	35
5940-00-823-1581	56	9	5310-01-286-6304	13	1
4730-00-871-6729	10	13	5935-01-308-8599	55	31
	13	4	5306-01-320-7024	39	2
5975-00-878-3791	1	26		52	7
5940-00-899-0260	17	28	5310-01-320-7038	30	17
4730-00-911-5707	11	38	5310-01-320-7100	31	1
5320-00-932-1972	1	6	5315-01-321-0400	51	5
	57	28	5315-01-321-2001	48	23
5940-00-958-1214	16	13		53	9
5331-00-973-8598	23	5	5306-01-321-3371	51	6
5940-01-003-8579	16	14		53	14
4730-01-007-5234	12	1	5306-01-321-3372	33	1
5310-01-009-6570	24	13		41	7

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
5306-01-321-3375	41	6	5330-01-478-4887	49	12
5325-01-321-3445	47	7	5330-01-478-4911	29	15
5999-01-323-4929	55	29	5330-01-478-5161	30	15
5935-01-325-0384	55	8	5310-01-478-5170	54	6
5970-01-326-1733	BULK	21	5310-01-478-5173	31	2
5905-01-329-1699	23	25	5310-01-478-5187	38	4
	24	17	5330-01-478-6002	44	5
4730-01-333-0914	26	12	5330-01-478-6004	41	5
5305-01-339-0822	23	3	3110-01-478-6106	48	29
	24	30	5340-01-478-6107	48	9
5935-01-339-9574	55	33	3120-01-478-6113	48	12
5975-01-360-4293	55	39	3120-01-478-6114	48	11
5305-01-366-1153	23	9	3120-01-478-6117	48	10
	24	36	3120-01-478-6132	47	15
4730-01-366-9017	26	4	3120-01-478-6135	47	14
4820-01-367-1836	10	17	3120-01-478-6137	47	12
5310-01-370-0052	24	26	5330-01-478-6354	54	3
5120-01-373-8976	4	47	5325-01-478-6921	52	2
2920-01-388-2776	4	29	5315-01-478-6939	53	18
5935-01-389-7312	55	4	4730-01-478-7130	32	15
6645-01-392-9615	18	4	2815-01-478-7478	49	8
5306-01-393-4861	45	7	2815-01-478-7489	45	10
5340-01-396-0454	4	65	2815-01-478-7493	47	8
8030-01-396-3362	BULK	29	2920-01-478-7511	28	1
4730-01-407-9298	25	9	2815-01-478-7538	45	1
5935-01-414-2582	55	9	4820-01-479-0226	46	18
5340-01-418-0208	57	9	5306-01-479-0327	54	4
5330-01-431-3620	29	11	5306-01-479-0352	30	16
4730-01-434-3360	29	6	5306-01-479-0355	49	15
4730-01-434-3361	29	5	5306-01-479-0358	43	7
5306-01-435-8407	49	13	5306-01-479-0360	48	17
5365-01-437-1064	31	6	5306-01-479-0361	47	11
5365-01-437-1065	31	5	5306-01-479-0363	53	24
2910-01-439-4915	29	16	5306-01-479-0365	30	20
5310-01-440-6749	28	2	5306-01-479-0367	50	2
5330-01-446-2136	9	9	8030-01-479-0487	BULK	28
5935-01-446-8180	21	10	3020-01-479-0690	48	27
	23	16	2815-01-479-0929	48	28
	24	7	5935-01-479-1823	55	13
	55	28	4720-01-479-2748	BULK	11
5935-01-447-5814	21	11	5305-01-480-1127	31	19
	55	27	5935-01-483-0852	17	17
4730-01-449-1233	57	27		19	21
5935-01-454-1789	21	22		55	68
5935-01-466-0260	55	56	5395-01-484-6537	55	67
5310-01-466-4926	16	6	5935-01-484-6537	17	16
5970-01-470-1630	BULK	17		19	19
	55	25	5310-01-484-9183	17	4
5310-01-470-2044	16	5		19	2
5935-01-470-8342	18	13		21	2
	55	21	5315-01-486-1942	54	2
5970-01-471-3258	BULK	32	4730-01-486-3490	31	17
4020-01-476-9072	4	48	5325-01-486-3846	53	11
5307-01-477-2256	31	9	3010-01-486-7671	54	5
4820-01-478-1226	49	7	3020-01-486-7673	52	4
5330-01-478-4849	31	18	4720-01-487-3507	BULK	31
5330-01-478-4851	31	13	5935-01-495-3346	21	27

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
5935-01-495-3353	21	24	4730-01-533-2908	46	11
5307-01-496-6030	33	4	5305-01-533-3695	29	4
5307-01-496-6035	38	1	4730-01-533-3731	42	6
5306-01-496-6045	38	5	4730-01-533-4181	46	9
4730-01-496-6572	33	5	5305-01-533-9478	29	14
4720-01-496-6578	33	6	4730-01-534-1985	49	9
5315-01-500-0653	45	12	2815-01-536-0903	51	2
5310-01-500-2374	33	8	5306-01-536-8998	42	8
5365-01-500-3268	45	9	3110-01-536-8999	53	8
5365-01-500-3332	31	7	5315-01-536-9062	46	7
5306-01-500-4262	39	1	5315-01-536-9063	46	17
5306-01-500-4266	22	20	3110-01-536-9064	53	5
	42	9	5340-01-536-9608	51	4
5306-01-500-4271	32	1	5340-01-536-9609	53	17
5310-01-500-6541	4	64	5340-01-536-9610	53	16
2815-01-500-6972	44	1	5365-01-536-9631	46	6
5305-01-500-8690	49	3		46	13
5306-01-500-8701	32	11		49	4
	49	11	5310-01-536-9994	53	20
	49	14	5330-01-537-0001	31	14
2910-01-500-8991	29	9	5310-01-537-0005	26	3
5935-01-503-3305	55	53		49	10
5315-01-506-3293	46	14	5331-01-537-0007	30	10
3431-01-506-4642	46	5		30	11
5365-01-506-4655	42	7	5331-01-537-0010	30	7
	46	10	5306-01-537-0876	53	21
3430-01-506-5021	39	5	3110-01-537-0879	53	6
5935-01-506-5555	23	10	3020-01-537-0881	33	9
	24	37	3120-01-537-1179	52	5
	55	44	3040-01-537-1181	52	3
3431-01-506-8102	42	5	3020-01-537-1182	52	1
3431-01-506-8134	32	5	3020-01-537-1183	53	2
	42	4	5315-01-537-1192	46	16
3431-01-506-8286	43	1	2815-01-537-1201	46	3
5306-01-506-9038	32	13	5305-01-537-1683	45	2
5306-01-507-0141	30	1	5340-01-537-1710	53	19
	49	16	3040-01-537-1790	52	6
5365-01-507-2201	31	12	5360-01-537-2057	30	13
5330-01-507-2967	29	10	5935-01-537-2064	46	12
4710-01-507-4421	32	14	4320-01-537-2098	46	8
	43	10	3020-01-537-2137	51	7
5330-01-507-5010	32	3	4320-01-537-2149	46	15
5935-01-512-1010	21	9	5935-01-539-9272	55	75
5310-01-515-2283	55	74	5340-01-539-9611	53	22
5935-01-519-1808	23	12	5340-01-540-8655	55	62
	24	38	5365-01-542-6383	43	2
	55	46	2815-01-542-6394	43	9
5935-01-522-4172	21	8	5340-01-542-6396	43	8
5935-01-523-1411	55	71	5331-01-546-8126	26	19
5935-01-523-5410	55	69	5999-01-556-4351	17	18
5935-01-523-8855	18	10		18	12
	55	23		55	22
6685-01-525-5884	32	4	5310-01-557-7264	26	7
5940-01-527-3588	55	35	5935-01-558-4762	55	64
6140-01-529-7226	2	6	4730-01-559-7103	25	3
5970-01-531-5648	BULK	16	5940-01-560-0703	55	63
	BULK	19	2910-01-560-5422	13	8

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
6115-01-561-7329	1	1	5340-01-586-8472	55	86
6115-01-561-7438	1	2	5330-01-586-9080	32	7
5310-01-562-6014	13	18	5330-01-586-9086	41	1
	55	80	5360-01-586-9113	53	23
5925-01-569-4427	3	3	4710-01-586-9233	37	2
5925-01-569-6394	3	5	4730-01-586-9235	29	8
5935-01-569-9460	55	32	4810-01-586-9239	51	1
5935-01-569-9470	55	37	4710-01-587-0639	29	17
5935-01-569-9506	56	11	4710-01-587-0644	29	12
5935-01-569-9542	55	41	4710-01-587-0647	29	20
5940-01-570-0849	56	12	4320-01-587-0865	12	11
5935-01-570-3453	56	16	2895-01-587-3807	53	10
5935-01-570-4538	55	34	2815-01-587-4306	38	3
5935-01-570-4557	56	14	5930-01-587-5396	6	4
5925-01-571-5799	3	4	2815-01-587-5843	48	24
5999-01-572-2092	55	14	2895-01-587-5845	48	25
2940-01-573-9124	26	5	2895-01-587-5851	48	26
5999-01-582-1957	55	52	2815-01-587-5862	53	4
5935-01-585-9802	55	49	2815-01-587-5919	53	3
5940-01-585-9905	35	11	2815-01-587-5938	53	1
5940-01-585-9913	19	41	2815-01-587-5949	47	9
	4	44	2815-01-587-5954	39	3
6505-01-585-9923	30	8	2895-01-587-6016	45	6
6150-01-586-0026	1	37	2895-01-587-6053	51	2
6685-01-586-0032	32	6	5930-01-587-6626	55	51
5930-01-586-0041	17	20		56	5
6150-01-586-0078	15	9	2940-01-587-6850	39	4
6150-01-586-0087	17	27	3110-01-587-6857	48	13
5935-01-586-0093	23	15	2815-01-587-6917	48	3
	24	5	3110-01-587-6924	48	19
5940-01-586-0213	18	7	3110-01-587-6935	48	15
	19	43	3110-01-587-6944	48	14
	35	8	5925-01-587-6954	2	21
	55	57	3110-01-587-6956	48	20
5925-01-586-0232	19	13	5999-01-587-6962	55	50
5940-01-586-0272	35	5	3110-01-587-6968	48	18
5961-01-586-0276	35	9	6115-01-587-7589	23	29
6150-01-586-0281	35	4		24	21
6150-01-586-0317	15	4	5935-01-587-7601	55	72
6150-01-586-0319	17	22	5935-01-587-7612	55	18
5998-01-586-0344	21	3	4820-01-587-8062	26	13
6150-01-586-0351	17	25	5340-01-587-8376	47	13
5940-01-586-0410	15	5	5330-01-587-8541	38	2
6150-01-586-0411	18	6	5340-01-587-8549	19	12
5935-01-586-0557	22	10	5340-01-587-8553	16	9
6150-01-586-0566	21	12	5307-01-587-8555	32	9
6150-01-586-0601	19	38	5310-01-587-8556	23	21
6150-01-586-0640	17	11		24	28
5940-01-586-0671	17	12	5360-01-587-8665	31	10
6150-01-586-0702	21	17	5330-01-587-8670	37	3
5940-01-586-1838	19	39	5330-01-587-8678	41	2
6150-01-586-1843	19	42	5310-01-587-8685	30	5
6150-01-586-1848	15	11	5330-01-587-8688	33	3
6150-01-586-1850	17	31	5360-01-587-8698	30	19
3110-01-586-2415	53	12	5340-01-587-8720	48	7
6150-01-586-2781	21	25	5306-01-587-8726	30	2
5340-01-586-8449	55	30	5340-01-587-8744	48	8

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
5306-01-587-8754	31	3	5310-01-589-3734	4	71
2815-01-587-9098	46	1	5325-01-589-3734	14	6
2815-01-587-9127	47	3	4730-01-589-3753	11	21
2815-01-587-9131	47	4	4910-01-589-3803	4	25
2990-01-587-9135	48	16	4910-01-589-3807	4	26
5340-01-587-9944	30	18	5930-01-589-4070	6	9
5306-01-588-0255	48	5	5310-01-589-4140	16	11
5340-01-588-0260	48	21	5330-01-589-4667	18	5
5340-01-588-0262	48	4	5331-01-589-4780	48	30
5340-01-588-0263	45	11	5365-01-589-4782	31	8
5310-01-588-0392	17	6	5365-01-589-5749	30	12
	18	14	5340-01-589-5756	43	6
	19	16	5340-01-589-5760	49	2
5330-01-588-0723	42	10	5330-01-589-5764	49	5
5330-01-588-0728	43	11	5330-01-589-6527	BULK	8
2910-01-588-0924	13	7	5330-01-589-6559	BULK	9
3030-01-588-0982	34	8	5325-01-589-7994	4	52
2930-01-588-2852	10	24	3020-01-589-9931	50	1
6145-01-588-3447	4	33	5340-01-589-9988	4	16
5999-01-588-3447	12	13		5	9
5340-01-588-3558	57	31	5340-01-590-0063	4	39
2940-01-588-3658	8	2	5930-01-590-0170	19	27
2940-01-588-3663	8	1	5365-01-590-0371	4	28
5307-01-588-4044	14	9	5950-01-590-0439	20	4
6115-01-588-4725	5	3	4730-01-590-1311	25	2
5935-01-588-5256	55	15	5935-01-590-1601	6	6
5935-01-588-5261	55	36	5340-01-590-1601	19	25
5999-01-588-5530	55	55	5340-01-590-3805	22	13
6150-01-588-5606	6	5	5935-01-590-5546	55	61
6150-01-588-5621	6	2	5306-01-590-5676	43	3
6145-01-588-6398	55	83	5999-01-590-5769	23	11
6145-01-588-6489	16	16		24	6
5975-01-588-6525	2	12		55	45
	25	6	5315-01-590-6563	30	14
6145-01-588-6563	55	84	5340-01-590-6569	53	15
6145-01-588-6588	55	82	5935-01-590-6702	19	24
6145-01-588-6850	BULK	1	5975-01-590-6706	12	9
5935-01-588-6862	55	65	4010-01-590-6749	BULK	35
6145-01-588-6873	28	3	5365-01-590-8328	21	4
6115-01-588-7288	23	7	4310-01-590-8438	42	1
	24	34	4320-01-590-8442	31	11
5340-01-588-8328	10	15	4310-01-590-8447	48	1
5305-01-588-9321	4	21	2930-01-590-8522	10	9
	5	12	5365-01-591-2541	31	4
2920-01-589-0612	34	7	5895-01-591-3501	4	18
4730-01-589-0851	11	37	6110-01-591-5195	15	1
4820-01-589-1015	11	40	5999-01-591-5666	9	6
5340-01-589-1081	55	48	4820-01-591-6101	23	22
6115-01-589-2624	57	1		24	12
5310-01-589-3727	1	47	5306-01-591-6658	23	36
	10	3		24	41
	11	7	5340-01-591-7301	8	12
	14	5	5305-01-592-1168	14	1
	16	2		16	8
	20	3		17	7
	4	4		20	1
5325-01-589-3727	26	16		26	15

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
	3	7	4730-01-595-5751	26	26
	4	72	5430-01-595-5961	10	23
	5	1	5310-01-595-5981	16	10
	55	81	4730-01-595-6012	13	11
4330-01-592-3418	8	5	5935-01-595-6861	19	15
6625-01-592-6232	2	14	2815-01-595-7311	24	16
6150-01-592-6626	2	5	2815-01-595-7312	40	3
6150-01-592-6629	2	4	6680-01-595-7336	26	9
6150-01-592-6637	17	35	2815-01-595-7518	24	15
6150-01-592-6641	17	39	5305-01-595-7637	10	7
6160-01-592-6648	2	7		11	4
6150-01-592-6743	2	13		19	8
6150-01-592-6746	2	15		2	9
4730-01-592-6772	10	19		4	1
4020-01-592-7898	26	21	6110-01-595-8949	35	1
5305-01-592-8054	13	2	2930-01-595-9350	10	11
	55	78	2910-01-595-9558	11	36
5935-01-592-8518	56	17	4010-01-596-0040	BULK	37
4010-01-592-8567	BULK	36	5310-01-596-0059	11	50
4010-01-592-8570	BULK	33	4730-01-596-1298	26	24
4710-01-592-9384	26	18	5305-01-596-1447	6	11
5340-01-592-9423	57	22	5305-01-596-3576	10	26
5975-01-592-9768	1	43		8	14
5970-01-593-1916	BULK	20	5305-01-596-3600	15	2
5340-01-593-2738	4	7		2	20
5340-01-593-2741	4	6		4	55
5340-01-593-2743	4	22	5310-01-596-3624	15	3
5340-01-593-2744	4	46	5310-01-596-3627	14	7
5340-01-593-2746	10	4	5305-01-596-3640	22	11
5340-01-593-2748	10	6	5305-01-596-3644	11	52
5340-01-593-2750	4	56	5305-01-596-3651	22	17
5342-01-593-2753	4	38		40	4
5342-01-593-2754	4	13	5305-01-596-3667	57	16
5340-01-593-2765	4	17	5305-01-596-3670	10	1
5330-01-593-2769	11	47		11	3
6150-01-593-2803	4	40		12	14
5340-01-593-3798	19	10		17	19
4010-01-593-4805	BULK	38		19	29
	15	10		2	24
5331-01-593-5319	36	3		4	5
5310-01-593-5320	6	10		57	5
5340-01-593-5321	9	2		57	6
5340-01-593-5913	4	61		8	9
5340-01-593-5979	4	36		9	7
5340-01-593-6025	4	14	5305-01-596-3673	17	44
5340-01-593-8291	9	4	5305-01-596-3678	20	6
4730-01-593-8323	13	9	5305-01-596-3693	22	2
	31	20		34	4
4730-01-593-8660	25	4		40	2
4720-01-593-8806	11	23		9	3
4010-01-594-2186	BULK	34	5310-01-596-3732	19	4
4720-01-594-2216	BULK	12	5310-01-596-3734	11	16
5970-01-594-2369	1	39		12	12
6150-01-594-2384	19	33		19	11
5340-01-595-3493	10	37		4	32
2815-01-595-3866	47	10		5	2
5925-01-595-4319	19	14	5310-01-596-3741	55	77

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
5310-01-596-3750	14	8	2815-01-597-6228	44	7
5310-01-596-3757	23	37	2815-01-597-6229	44	6
	24	40	4720-01-597-6246	13	21
5310-01-596-3763	4	20	4720-01-597-6254	13	22
6154-01-596-4356	BULK	40	4720-01-597-6349	11	43
5315-01-596-4497	46	4	4720-01-597-6400	13	23
4730-01-596-5173	57	24	2815-01-597-6531	43	5
4720-01-596-5240	BULK	10	4710-01-597-6532	29	7
	1	10	2815-01-597-6535	29	1
4010-01-596-5308	BULK	39	2815-01-597-6536	29	2
7690-01-596-5339	57	30	4730-01-597-6538	43	4
4730-01-596-6452	12	19	6115-01-597-6672	24	1
4710-01-596-6464	11	25	4730-01-597-9059	11	1
4730-01-596-6482	26	17	4730-01-597-9115	8	7
4720-01-596-6552	12	8	4710-01-597-9188	8	8
4730-01-596-6649	11	20	4730-01-597-9388	11	39
4730-01-596-7041	57	20	4720-01-597-9419	57	10
4730-01-596-7215	10	36	4730-01-597-9421	11	10
	25	5		11	42
	57	33	5305-01-598-0197	57	19
4730-01-596-7242	10	28	5310-01-598-0222	22	21
	10	32		35	13
4730-01-597-1015	8	10	6115-01-598-1557	23	1
3040-01-597-1148	4	23	6620-01-598-2271	26	2
5340-01-597-1365	4	53	5310-01-598-3316	22	14
5340-01-597-1375	5	8	5310-01-598-7748	34	9
5365-01-597-1376	12	18	5305-01-598-7757	11	46
5330-01-597-1377	11	49	2990-01-598-9708	9	5
5340-01-597-1379	5	5	5999-01-599-2860	19	3
5340-01-597-1380	4	57	6150-01-599-2923	BULK	3
6160-01-597-1381	2	1	6150-01-599-2925	BULK	4
5945-01-597-1462	3	2	2990-01-599-8433	36	2
5310-01-597-1527	11	2	2990-01-599-8454	30	3
5305-01-597-1559	24	39	6160-01-600-2840	2	3
2815-01-597-2562	27	1	2930-01-600-3133	10	38
2815-01-597-2940	47	5	4730-01-601-9476	13	14
2815-01-597-2945	47	6	5310-01-601-9478	11	27
5310-01-597-3069	22	3	5925-01-602-5165	19	30
5340-01-597-3073	4	68	5940-01-602-8183	17	36
5340-01-597-3082	4	35		21	18
5307-01-597-3973	35	3	5305-01-603-1160	34	6
4710-01-597-5163	57	12	5920-01-603-2636	19	31
2815-01-597-5235	25	1	4720-01-603-2689	25	8
4710-01-597-5307	9	10	5120-01-603-9678	58	4
4310-01-597-5318	11	44	5120-01-603-9691	58	6
4730-01-597-5658	10	29	5120-01-603-9692	58	5
4720-01-597-5677	8	11	6685-01-604-2696	58	2
4730-01-597-5709	10	31	4910-01-604-2735	58	1
4710-01-597-5962	10	27	5305-01-604-4502	17	9
4710-01-597-5963	10	33		18	1
4720-01-597-5983	10	35		19	26
6115-01-597-6218	23	18	4910-01-605-6009	58	3
2815-01-597-6223	54	1	5331-01-609-0754	12	2
2930-01-597-6224	33	2	4720-01-614-1309	26	11
4820-01-597-6225	42	2	5340-01-617-6406	56	13
4820-01-597-6226	42	3	5310-01-617-7577	4	63
4730-01-597-6227	46	2	4930-01-617-7718	13	6

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
5930-01-619-0979	6	3	4730-01-643-7372	26	6
4730-01-619-6255	31	16	2910-01-651-8466	12	3
5999-01-619-7656	19	32	5310-12-124-0184	34	1
5340-01-619-7814	2	10	5310-12-125-0048	22	18
5340-01-619-7821	2	19	5315-12-135-9147	40	5
5310-01-619-8688	11	51	5305-12-141-9806	17	5
5310-01-619-8939	12	5		19	1
3120-01-619-8956	48	31		21	1
3120-01-619-9835	48	32	5305-12-163-0920	4	66
5306-01-619-9837	22	5	5305-12-181-5223	26	23
5340-01-620-0446	55	70		36	1
5340-01-620-0621	55	73	5310-12-318-9539	10	22
3120-01-620-2608	48	33		34	3
5310-01-620-3113	22	9		9	1
	22	12	5330-12-382-6622	BULK	25
5305-01-620-9474	11	48	5330-12-382-6625	BULK	26
5310-01-620-9610	22	7		BULK	27
5340-01-621-0245	56	3	9390-12-382-7191	BULK	24
5305-01-621-8388	16	3	5305-14-514-1570	37	4
6145-01-624-3795	BULK	6	5340-14-514-1736	53	7
5306-01-630-3956	23	34	5340-15-900-3805	22	6
5935-01-630-9863	55	6	2910-20-002-7185	57	23
4730-01-630-9887	26	10	9150-20-004-4776	BULK	7
5340-01-631-0355	13	17	4720-20-005-9979	57	25
5340-01-631-0430	57	14	4720-20-005-9980	BULK	15
5970-01-631-2564	BULK	18	4720-20-006-0172	BULK	13
5310-01-631-4272	11	28	4720-20-006-1632	BULK	14
9905-01-631-9978	25	7	5340-20-006-2750	57	4
2910-01-632-3021	57	3	4730-20-006-4607	57	32
6150-01-633-3633	2	8	5306-22-127-1431	45	5
6150-01-633-3780	19	18	5310-33-208-2057	10	39
6150-01-633-3801	56	1		11	19
6150-01-633-4902	55	1		12	16
5430-01-633-6801	10	25		17	21
4720-01-633-6914	11	22		19	6
5310-01-633-9835	22	8		2	2
5340-01-634-0030	26	20		32	12
5340-01-640-8447	4	10		4	12
2815-01-640-9828	23	2		4	31
5310-01-641-0640	4	11		5	4
2590-01-641-2083	25	11		57	8
	26	8		8	13
5340-01-641-3848	10	10	5340-98-205-9079	49	6
5305-01-641-5048	12	4	2930-98-205-9103	33	7
5310-01-641-5050	55	76	5305-99-219-7181	11	9
2805-01-641-5714	4	8		19	9
6160-01-641-8971	4	9		4	15
5310-01-642-3008	22	4		5	6
5310-01-642-3088	17	2	5340-99-235-4309	44	3
4720-01-642-3285	32	16	5310-99-371-1050	17	8
5999-01-642-4392	19	20		18	2
	21	23		19	17
5305-01-642-5761	11	26	2815-99-610-4361	44	2
4730-01-642-5869	10	30	5360-99-911-5629	44	4
5305-01-642-6060	13	19			
5310-01-643-2945	5	11			
8040-01-643-2960	BULK	30			

STOCK NUMBER			FIG.	ITEM	STOCK NUMBER			FIG.	ITEM
2990-99-917-5958			33	10					

END OF WORK PACKAGE

PART NUMBER	FIG.	ITEM	PART NUMBER	FIG.	ITEM
15861-22980	47	15	1788880	55	31
15861-9665-0	31	14	17KP739	56	12
15875-1617-3	53	10	187050F-03-1	2	21
15875-24013	52	4	19077-53650	29	11
15875-2425-0	52	6	19202-9101-0	30	16
15875-2428-2	52	5	19215-2328-0	48	3
15875-24320	52	2	19215-9916-0	41	5
15875-9934-0	52	1	19280-5724-0	30	12
15877-04140	49	12	19434-7301-4	32	4
15881-2331-0	48	28	19837-5772-3	30	4
15881-91030	50	2	1E051-7326-0	32	2
16000-5423-0	53	23	1E110-5700-0	30	3
16001-53000	29	9	1E121-1231-0	38	3
16001-5390-0	29	8	1E212-7270-0	32	8
16006-52092	31	5	1E132-7335-0	32	16
16006-52112	31	6	1E152-5605-0	53	15
16006-52122	31	7	1G065-4236-0	29	19
16030-9601-0	31	12	1G460-0404-0	48	22
16221-7327-0	32	3	1G460-0409-0	48	6
16241-73360	32	15	1G460-0454-0	48	5
16241-7337-0	32	14	1G460-0704-0	48	21
	43	10	1G460-0709-0	48	4
16809-4202-0	29	20	1G460-1431-2	45	11
16809-4203-0	29	17	1G460-1435-0	45	4
16809-4250-0	29	12	1G460-2347-0	48	24
16825-0402-4	49	1	1G460-2382-0	48	13
16851-13280	44	1	1G460-2383-0	48	18
16851-1511-0	45	10	1G460-2391-0	48	25
16851-1555-2	51	1	1G460-2392-0	48	26
16851-1621-2	46	3	1G460-2393-0	48	14
16851-2198-2	47	10	1G460-2394-0	48	19
16851-2201-5	47	9	1G460-2395-0	48	15
16851-22320	47	12	1G460-2396-0	48	20
16851-2233-0	47	13	1G460-5371-2	29	1
16851-3211-0	39	4	1G460-5372-3	29	2
16851-3501-2	54	1	1G460-5373-2	29	3
16851-35152	54	3	1G513-3655-0	46	11
16851-3695-0	49	6	1G639-5715-0	30	6
16851-5115-0	53	2	1G687-1311-0	44	7
16851-5641-0	30	19	1G687-1312-0	44	6
16851-7343-0	33	3	1G687-2111-3	47	5
16851-9626-0	46	15	1G687-2177-0	47	1
16851-9627-0	46	8	1G687-2178-0	47	2
1685122140	47	11	1G687-2190-3	47	6
16861-1602-4	53	1	1G700-5216-0	31	8
16861-93310	49	3	1G700-5220-0	31	4
16864-1651-0	51	7	1G801-05120	43	8
16866-5730-2	30	18	1G801-0520-3	43	9
16866-9201-0	30	5	1G820-0413-0	49	5
16871-1443-0	45	9	1G820-5101-0	31	11
16871-2131-0	47	8	1G820-5611-2	30	9
16871-9105-0	30	2	1G820-5628-2	49	2
16871-9106-0	31	3	1G820-5648-2	31	10
16871-9730-0	53	12	1G820-5774-3	30	10
16878-5792-0	30	13	1G820-7303-0	33	2
16881-65512	28	1	1G911-9102-2	43	3
17331-5919-0	46	16	1G952-0101-9	46	1

PART NUMBER	FIG.	ITEM	PART NUMBER	FIG.	ITEM
04-20400	4	49	04-20534	12	20
04-20404	4	73	04-20535	11	47
04-20405	4	70	04-20536	11	49
04-20406	12	18	04-20538	1	45
04-20407	14	4	04-20547	55	40
04-20409	21	3	04-20556	15	7
04-20417	22	16		15	14
04-20421	6	5		17	14
04-20422	6	2		17	34
04-20424	7	1		18	9
04-20442	5	3		35	6
04-20447	17	13		56	8
	21	19	04-20556-3	1	41
04-20448	17	37	04-20556-8	17	30
	17	40	04-20556-9	11	14
	18	8		4	43
	19	35	04-20567	15	6
	19	44		15	10
	21	14		17	24
	21	20		17	26
	21	26	04-20575	BULK	39
	35	7	04-20577	BULK	12
	55	16	04-20581	13	16
04-20453	18	6	04-20585	2	7
04-20454-3	14	2	04-20597	55	18
04-20454-4	14	3	04-20598	55	15
04-20468	55	48	04-20615	11	30
04-20469	55	49	04-20618	12	19
04-20472	17	16	04-20619	12	17
	19	19	04-20623	12	15
	55	67	04-20628	55	55
04-20474	55	65	04-20630	4	36
04-20479	55	5	04-20645	2	17
	55	6	04-20649	4	59
04-20480	55	2	04-20651	4	61
04-20491	55	47	04-20672	8	7
04-20499	1	46	04-20673-1	2	5
04-20501	11	36	04-20674-1	2	8
04-20513	23	11	04-20674-2	2	4
	24	6	04-20675-1	2	13
04-20514	19	20	04-20675-2	2	15
	21	23	04-20696	15	11
04-20521	18	10	04-20703	18	11
	55	23		21	7
04-20523	23	12		55	66
	24	38	04-20707	21	9
	55	46	04-20708	21	8
04-20524	21	10	04-20711	21	25
	21	11	04-20712	19	42
	23	16	04-20720	17	12
	24	7	04-20723	10	35
04-20526	17	17	04-20724	10	29
	19	21	04-20725	8	11
	55	68	04-20726	10	31
04-20533	15	13	04-20727	10	34
	17	29	04-20732	19	10
	17	33	04-20733	10	27

PART NUMBER	FIG.	ITEM	PART NUMBER	FIG.	ITEM
04-20734	10	33	04-21007	8	1
04-20735	8	8	04-21011-1	1	19
04-20736	9	10	04-21016	1	30
04-20744	11	29	04-21017-1	1	36
04-20747	4	13	04-21022-1	1	17
04-20748	4	14	04-21022-2	1	18
04-20749-1	22	3	04-21023-1	1	13
04-20749-2	22	10	04-21023-2	1	14
04-20752	11	40	04-21024-1	1	15
04-20759	16	1	04-21024-2	1	16
04-20767-1	13	21	04-21025	1	25
04-20767-12	13	22	04-21026	1	5
04-20767-25	11	23	04-21030-1	10	5
04-20767-26	11	22	04-21031-1	10	12
04-20767-29	11	43	04-21031-4	4	60
04-20767-4	13	20	04-21031-5	5	7
04-20767-6	13	23	04-21037	10	9
04-20768	19	23	04-210383-3	9	2
04-20769-1	23	36	04-21039	4	67
	24	41	04-21041-1	9	4
04-20771	35	3	04-21043	11	1
04-20774	57	18	04-21045	4	68
04-20775	57	2	04-21046	4	69
04-20792	11	31	04-21051-1	56	6
04-20793	11	6	04-21070-3	10	14
04-20829	11	32	04-21070-4	10	18
04-20832	10	4	04-21070-5	10	21
04-20833	10	6	04-21072	4	35
04-20849	2	3	04-21073	4	22
04-20852-1	57	21	04-21074	4	25
04-20860	32	10	04-21075	4	26
04-20861	11	39	04-21076	4	23
04-20872-1	4	30	04-21077-1	1	11
04-20880	5	10	04-21077-2	1	12
04-20883	4	76	04-21078-1	1	9
04-20884	13	15	04-21078-2	1	10
04-20901	17	15	04-21080	56	1
	55	17	04-21081	4	57
04-20902-1	17	1	04-21102	4	46
04-20902-2	21	5	04-21103	16	9
04-20902-5	17	41	04-21104	4	56
04-20908	4	80	04-21106	1	29
04-20909	4	79	04-21107	2	1
04-20916	10	8	04-21116-1	55	82
04-20940	4	3	04-21116-5	55	84
04-20941	4	77	04-21116-7	16	16
04-20944	4	17	04-21130	1	3
04-20950	32	9	04-21131	1	4
04-20962	55	51	04-21152	17	3
04-20962-6	56	3	04-21153-1	11	11
04-20985	4	7	04-21153-13	11	33
04-20986	4	6	04-21153-3	11	17
04-20987	4	19	04-21153-4	4	40
04-20992	4	2	04-21153-6	4	74
04-20993	8	5	04-21154	11	15
04-20997	10	2		19	41
04-20999	10	38		4	44

PART NUMBER	FIG.	ITEM	PART NUMBER	FIG.	ITEM
04-21158	11	13	04-21674	19	28
	11	18	04-21676	57	30
	11	34	04-21683	34	5
	19	40	04-21684	34	2
	4	42	04-21701	6	11
	4	75	04-21704	19	33
04-21159	4	38	04-21713	55	20
04-21162	4	34	04-21723	4	9
04-21167	19	39	04-21724	4	10
04-21175	57	10	04-21725	4	8
04-21205	57	17	04-21732	25	11
04-21208-3	57	11	04-21733	4	11
04-21208-4	57	13	04-21742	26	10
04-21210	11	44	04-21748-1	4	58
04-21215	57	22	04-21763	26	8
04-21219	57	32	04-21766	4	63
04-21221	57	4	04-21771	31	16
04-21228	1	37	04-21796	19	32
04-21236	1	8	04-21815	26	20
04-21237	1	20	04-21818	19	31
04-21240	1	21	04-21820	56	16
04-21282-1	4	78	04-21832-2	25	8
04-21292	14	9	04-21869	26	25
04-21295	26	21	04-21897	26	6
04-21299	26	22	04-21917-3	12	3
04-21318-1	19	3	04512-60050	53	20
04-21318-2	12	13	04512-60060	31	1
	4	33	04612-00170	53	11
04-21321	9	6	04814-00160	39	5
04-21322	4	48	04814-10070	30	11
04-21338	9	8	04814-10160	30	7
04-21343	2	23	04814-16220	48	30
04-21348	1	27	04814-50300	43	1
04-21352	11	21	05012-00508	46	17
04-21365	4	18	05012-00814	46	7
04-21386	57	12	0508-0055	24	3
04-21393	10	37	0526-0015	24	26
04-21405	3	6	0526-0390	23	21
04-21406	3	3		24	28
04-21412	35	11	05411-00314	30	14
04-21417-2	2	11	05411-00318	53	18
04-21417-3	2	19	05411-00420	45	12
04-21425	35	4	05712-00408	54	2
04-21431-3	57	15	05712-00515	48	23
04-21452	26	9		53	9
04-21475-1	1	35	05712-00518	51	5
04-21485	13	5	06311-85025	46	2
04-21502	10	19	070313	10	25
04-21503	57	29	070506	10	23
04-21504	13	3	07715-00401	51	2
04-21529-1	26	11	07715-00801	53	5
04-21547-3	57	26	07715-03207	48	2
04-21578	21	18	07715-03211	49	7
04-21599	25	7	07715-03217	53	3
04-21614-1	17	35	0800-0003	24	27
04-21614-2	17	39	0800-0050	23	19
04-21670	57	1		24	14

PART NUMBER	FIG.	ITEM	PART NUMBER	FIG.	ITEM
080061BE	10	24	15261-6641-0	53	21
08153-06203	53	8	15261-9601-0	42	7
0850-0040	24	13		46	10
0850-0050	23	20	15261-9616-0	46	6
085295	17	4	15263-1237-0	9	9
	21	2	15321-9626-0	42	5
09130SWC8	BULK	5	15324982	55	30
09318-88125	43	4	15451-9627-0	46	5
09661-40040	29	21	15481-9401-0	49	10
09661-40085	29	18	15521-9602-0	46	9
09661-40130	29	13	15521-9603-0	46	13
1/4X1/4 F3HG	25	2		49	4
1011-347-0605	55	73	15601-96650	29	15
1011-348-0805	55	70	15785-2437-0	52	3
1060-16-0622	55	45	15841-04562	48	17
1062-16-0622	17	18	15841-0480-3	41	3
	18	12	15841-0481-5	41	4
	55	22	15841-0482-3	41	2
1062-20-0122	55	14	15841-1354-0	42	2
11.131.45.7	35	1	15841-1356-0	42	3
114018	56	15	15841-1403-0	45	1
11420-13150	44	5	15841-1423-0	45	2
12010300	55	33	15841-1627-0	51	4
12015899	55	39	15841-1632-0	53	13
12034051	55	29	15841-23250	48	29
12065287	55	53	15841-2411-0	48	27
12077411	55	35	15841-35660	54	5
12089290	55	52	15841-3693-0	49	8
12129381	56	13	15841-51320	31	17
12162193	55	56	15841-51350	31	19
12191818	55	50	15841-5362-2	29	10
12422624	55	44	15841-5545-2	53	4
12485651-125	55	74	15841-5569-0	53	6
125HB-3-2	31	15	15841-5606-0	53	16
125HB-3-4	57	27	15841-5613-0	53	17
125HBL-4-2	10	16	15841-5615-0	53	22
13230E6382-8	22	8	15841-5623-0	53	19
13230E6651-24	BULK	40	15841-5711-2	30	8
14601-0345-0	42	8	15841-57212	30	15
14601-1324-0	44	4	15841-7286-0	33	7
14601-1333-0	44	3	15841-7287-0	33	6
14601-1336-0	44	2	15841-7292-3	32	7
14601-1424-0	45	3	15841-7296-0	33	5
14971-4275-0	29	14	15841-7302-0	46	18
15108-5728-00	30	20	15841-7425-0	33	9
15221-3365-0	46	4	15841-91010	49	15
15231-3396-0	46	14	15841-9105-0	54	4
15241-3229-0	49	9	15841-91500	31	9
15261-0337-0	42	6	15841-9151-0	33	4
15261-2133-0	47	7	15841-92320	31	2
15261-23530	48	10	15841-9401-0	26	3
15261-2354-3	48	7	15841-9602-0	32	5
15261-2395-0	48	11		42	4
15261-23960	48	12	15841-96650	31	13
15261-2397-3	48	8	15841-96660	31	18
15261-2398-3	48	9	15842-9402-2	45	8
15261-5547-0	53	7	15861-22970	47	14

PART NUMBER	FIG.	ITEM	PART NUMBER	FIG.	ITEM
15861-22980	47	15	1788880	55	31
15861-9665-0	31	14	17KP739	56	12
15875-1617-3	53	10	187050F-03-1	2	21
15875-24013	52	4	19077-53650	29	11
15875-2425-0	52	6	19202-9101-0	30	16
15875-2428-2	52	5	19215-2328-0	48	3
15875-24320	52	2	19215-9916-0	41	5
15875-9934-0	52	1	19280-5724-0	30	12
15877-04140	49	12	19434-7301-4	32	4
15881-2331-0	48	28	19837-5772-3	30	4
15881-91030	50	2	1E051-7326-0	32	2
16000-5423-0	53	23	1E110-5700-0	30	3
16001-53000	29	9	1E121-1231-0	38	3
16001-5390-0	29	8	1E212-7270-0	32	8
16006-52092	31	5	1E132-7335-0	32	16
16006-52112	31	6	1E152-5605-0	53	15
16006-52122	31	7	1G065-4236-0	29	19
16030-9601-0	31	12	1G460-0404-0	48	22
16221-7327-0	32	3	1G460-0409-0	48	6
16241-73360	32	15	1G460-0454-0	48	5
16241-7337-0	32	14	1G460-0704-0	48	21
	43	10	1G460-0709-0	48	4
16809-4202-0	29	20	1G460-1431-2	45	11
16809-4203-0	29	17	1G460-1435-0	45	4
16809-4250-0	29	12	1G460-2347-0	48	24
16825-0402-4	49	1	1G460-2382-0	48	13
16851-13280	44	1	1G460-2383-0	48	18
16851-1511-0	45	10	1G460-2391-0	48	25
16851-1555-2	51	1	1G460-2392-0	48	26
16851-1621-2	46	3	1G460-2393-0	48	14
16851-2198-2	47	10	1G460-2394-0	48	19
16851-2201-5	47	9	1G460-2395-0	48	15
16851-22320	47	12	1G460-2396-0	48	20
16851-2233-0	47	13	1G460-5371-2	29	1
16851-3211-0	39	4	1G460-5372-3	29	2
16851-3501-2	54	1	1G460-5373-2	29	3
16851-35152	54	3	1G513-3655-0	46	11
16851-3695-0	49	6	1G639-5715-0	30	6
16851-5115-0	53	2	1G687-1311-0	44	7
16851-5641-0	30	19	1G687-1312-0	44	6
16851-7343-0	33	3	1G687-2111-3	47	5
16851-9626-0	46	15	1G687-2177-0	47	1
16851-9627-0	46	8	1G687-2178-0	47	2
1685122140	47	11	1G687-2190-3	47	6
16861-1602-4	53	1	1G700-5216-0	31	8
16861-93310	49	3	1G700-5220-0	31	4
16864-1651-0	51	7	1G801-05120	43	8
16866-5730-2	30	18	1G801-0520-3	43	9
16866-9201-0	30	5	1G820-0413-0	49	5
16871-1443-0	45	9	1G820-5101-0	31	11
16871-2131-0	47	8	1G820-5611-2	30	9
16871-9105-0	30	2	1G820-5628-2	49	2
16871-9106-0	31	3	1G820-5648-2	31	10
16871-9730-0	53	12	1G820-5774-3	30	10
16878-5792-0	30	13	1G820-7303-0	33	2
16881-65512	28	1	1G911-9102-2	43	3
17331-5919-0	46	16	1G952-0101-9	46	1

PART NUMBER	FIG.	ITEM	PART NUMBER	FIG.	ITEM
1G960-0436-0	41	1	3271-12-65	BULK	33
1G960-0551-2	43	5	3271-14-41	BULK	34
1G960-0555-0	37	2	3271-16-26	BULK	35
1G960-1177-0	37	1	3271-20-10	BULK	36
1G960-1450-5	43	6	3271-8-133	BULK	38
1G960-2105-0	47	3	3289	58	2
1G960-2109-0	47	4	34150-2758-0	46	12
1G962-0150-2	39	3	35111	56	4
1G962-0304-5	42	1	35112	56	9
1G962-0331-3	42	10	35277	15	5
1G962-0705-0	48	16	35678	15	12
1G962-1182-0	37	3	36152	1	40
1G962-1235-0	38	2		21	13
1G962-1426-2	45	6		55	58
1G962-1452-2	43	11	36160	17	38
1G962-1601-5	51	2		23	14
1G962-2301-2	48	1		24	4
1G962-2375-2	48	31	36808	15	15
1G962-2376-2	48	32		17	32
1G962-2377-2	48	33	39101-75030	14	6
1G962-4250-0	29	7		4	71
1G962-6556-0	28	3	39101-76030	10	3
1G962-7428-0	50	1		11	7
2-36160-1	35	5		14	5
202229A	9	5		16	2
213P-8	25	9	3918199S	8	12
215M-ONAN-01	13	6	3946457 S	8	4
218N1T02	56	5	3946459 S	8	3
22190-220002	26	7	40-10-0005	BULK	14
222E3T02	2	10	40-10-0016	BULK	15
22310-200	3	5	40-10-0017	57	25
22330-200	3	4	40CNFHS	4	64
24311-000320	26	19	4219-0109	BULK	10
25-1942-450000	57	23	4230-0134	BULK	22
25960	19	30	44832	10	7
28137-3	22	6		11	4
2915011007	4	37		19	8
29550-4	22	13		2	9
2HB188	55	75		4	1
2KP504	55	62	5-10-15STTEKIT		
3/ 4 CD-S	26	12	5-60STTEKIT		
30-10-0003	BULK	13	5024-0250	32	6
304-0807	23	25	503-0183	23	17
	24	17	509-0094	23	5
3058529	BULK	11	509-0099	24	32
32004-A2	56	11	510-0112	23	28
32004-B2	56	17	5100102	24	20
32004-TP2	56	14	526-0008	23	26
32006-A22	55	32		24	18
32006-B22	55	36	53839S	36	3
32006-C22	55	41	55936-2	17	36
32006-D22	55	37	55PP02872757640064	BULK	20
32006-TP2	55	34	56541	BULK	28
322123	29	16	60225	6	10
322135	29	6	6202	10	13
322136	29	5		13	4
327-6-133	BULK	37	639101-76030	26	16

PART NUMBER	FIG.	ITEM	PART NUMBER	FIG.	ITEM
64-154	58	4	88-21776	1	33
64-308	58	6	88-22307	26	4
64-309	58	5	88-22336-1	16	12
68035	BULK	29	88-22836	2	6
69-570-2	4	28	89418	BULK	2
69-668	1	31	8HA889	21	27
6HB683	55	13	90278A331	4	21
72-2236	16	14		5	12
7HA302	21	24	9171KZ4104-21572	10	15
8-325-82	4	39	9176K155	1	32
8-325-88	4	16	92461A500	22	9
	5	9		22	12
813-0100	23	33	9269	36	2
	24	23	929939-1	55	63
815-0181	23	3	93-193	13	1
	24	30	95-8165	2	18
815-0774	23	9	9512	BULK	4
	24	36	9514	BULK	3
81683	18	5	95395A250	16	11
84-13000	11	35	963040-3	55	64
846-1p	BULK	7	97-3106A-10SL-4S(624)	55	61
85094-12	18	4	97-50-170-11	4	65
853-0008	23	32	98-19694	1	22
	24	24		1	28
853-0013	23	8	99-20-0019	57	3
	24	35	A002TA9071	34	7
862-0003	23	35	A026C355	23	34
870-0131	23	27	A026E304	23	13
	24	19	A026E310	24	2
88-20075	1	7	A026F710	23	7
88-20110	1	34		24	34
88-20218	4	29	A026F712	23	2
88-20225	23	22	A026F713	24	29
	24	12	A026G777	24	10
88-20226	24	16	A026H431	24	9
88-20227	24	15	A026J838	23	29
88-20230	23	4		24	21
	24	31	A030S159	23	23
88-20275-1	55	24	A030X159	24	11
88-20275-2	55	38	A032X895	23	31
88-20275-3	18	7		24	22
	19	43	A034L400	23	30
	35	8		24	25
	55	57	A035J078	22	4
88-20275-4	19	34	A040N866	23	18
88-20541-1	BULK	16	A049E817	10	10
	1	43	A1512	BULK	24
88-20541-11	BULK	18	A2539	BULK	8
	55	42	A3709	BULK	25
88-20541-14	BULK	19	A3921	BULK	26
88-20541-15	BULK	32		BULK	27
	35	10	AA55804-3B 9FT	1	26
88-20541-9	BULK	17	AEB02C375B50WA6FY1	22	5
	55	25	AEN04M508000CX0A36	4	24
88-20568-3	16	5	AEN12F250000CH2A31	15	3
88-21146	4	47	AEN15M10C000WA2AA1	14	7
88-21633	10	17	AEN16M508000CX0A36	5	11

PART NUMBER	FIG.	ITEM	PART NUMBER	FIG.	ITEM
AEN18M08B000BA7H91	22	21	AEW13X375000GD5A21	55	77
	35	13	AEW20M010000DB8A31	11	27
AEN18M08B000BB1K42	34	9	AEW20X010000BD8A21	14	8
AEN18M10C000DG8A31	11	28	AEW22X190000EA1AA1	12	5
AES01C438B75WA6FY1	22	11	AEW23X06R10MSE4A31	4	20
AES07M06A070WB4AA1	11	52	AEW24X37N062BD6FY1	23	37
AES07M06B045WB4AA1	13	19		24	40
AES07M10B020WB4K41	22	17	AEW25X266062EA1AF1	11	51
AES10C025CZ7A32	11	26	AF26116	8	2
AES10M06A0 55WB4K42	20	6	AS25036-157	56	10
AES10M06A012WB4K42	57	16	ASTM D5363	BULK	23
AES10M06A016WB4K42	10	1	ATUM 24/6-0	1	39
	11	3	ATUM-24/6-0	BULK	31
	12	14	B120-7032	3	2
	17	19	B1834C06030N	16	3
	19	29	C22275-020-4	57	31
	2	24	CD042256C	1	42
	4	5	CD3101E18-19S	1	44
	40	4	CD3106E18-19P	1	38
	57	5	CD389/26WH21SN-BS23	55	7
	57	6	CJV-0911	13	17
	8	9	CJV1709Z1	57	14
	9	7	COV-0813	55	86
AES10M06A020 WB4K42	17	7	COV-1413	55	87
AES10M06A020WB4K42	14	1	CT150E24E2S	15	1
	16	8	D38999/26WH21SN	55	8
	20	1	D38999/26WJ29SN	55	3
	26	15	DG3M6F-S-RPC	16	13
	3	7	DHR12US9206*01EF1	6	4
	4	72	DIN 125 M3	17	8
	5	1		18	2
	55	81	DIN 125 M4	19	2
AES10M06A030WB4K42	57	19	DIN 6923-M8X1.25	10	22
AES10M06A045WB4K42	17	44		34	3
AES10M08B020WB4K42	10	26	DIN-9021-M6	13	18
	8	14		55	80
AES10M08B025WB4K42	22	2	DIN125-M3	19	17
	34	4	DIN126-11-100HV	22	18
	40	2	DIN126-9-100HV	34	1
	9	3	DIN127-M6	11	45
AES10M08B060CH1K42	34	6	DIN1481-M3X40	40	5
AES10M10C030WB4K42	13	2	DIN6923-M10	35	2
	55	78		55	76
AES10N10C025WB4K42	25	10	DIN6923-M4	17	2
AES46M508016CH2A31	15	2		19	5
	2	20		21	6
	4	55	DIN6923-M6	10	39
AES47M407016DG6CP2	11	48		11	19
AESZAC190375WA1FY1	11	46		12	16
AEW01X375000BD6AQ1	22	7		17	21
AEW01X437000BD6AQ1	22	14		19	6
AEW13X164000GD5A21	19	4		2	2
AEW13X250000GD5A21	11	16		32	12
	12	12		4	12
	19	11		4	31
	4	32		5	4
	5	2		57	8

PART NUMBER	FIG.	ITEM	PART NUMBER	FIG.	ITEM
DIN6923-M6 – continued					
	8	13		21	16
DIN6923-M8-8-A2P	9	1	MS25043-16DA	6	1
DIN7985A1-M4X8	4	66	MS25043-18DW	19	25
DIN912-M6X16-12.9-A2P	26	23		6	6
	36	1	MS25043-20DA	6	7
DIN931-M5X30	12	4	MS25224-1	6	8
DIN933-M3X16	17	9	MS3102R18-19SN	19	24
	18	1	MS3420-4	55	60
	19	26	MS35489-46	10	20
DIN933-M4X6-8.8-A2P	17	5	MS35645-1	11	8
	19	1	MS9025-17	57	7
	21	1	P35900661	11	37
DIN934-M3	17	6	P4055-5001-1	26	2
	18	14	PLT4S-M30	2	12
	19	16		25	6
DIN934M5	2	16	PR11-42-15.0A-38809-15	19	14
DIN943M5	35	12	PR11-62-15.0A-38808-15-V	19	13
DKR12US0094*02*EA	6	3	R15S	13	7
DR20BLKWRTR	19	15	RBF-7.1-11.1-12	4	52
DT04-2P	23	10	RK 30495	13	8
	24	37	RS62200	11	50
DT04-4P-EP13	55	69	SAE J1231 8-12 430160B	25	4
DT06-08SA	55	72	SAE J1508 CTB-16	26	24
DT06-2S	55	27	SAE J1508 CTB-17	26	26
E9151-33140	43	2	SAE J1508 CTB-29	57	9
EF20C0028722	BULK	6	SAE J514 4-4 070202C	13	9
EF20C0038722	BULK	1		31	20
EM4A080	55	83	SAE J514 4-4 140137C	13	10
FFW92 TYPE A CLE GRI	16	6	SAE J514 4-4 140339C	11	38
HAB-80-S	2	14	SAE J514 4-6 070220C	12	7
HH150-32430	26	5	SAE J514 5-4 070302C	11	41
ISO7380-M6X12-A2-70	11	9	SAE J514 5-6 070220C	12	1
	19	9	SAE J515 CH 290 X0386H	12	2
	4	15	SAE J530 2-2 130239B	26	1
	5	6	SAEJ12312-34314608	13	11
KUB5ENGCOMAD	58	1	SAEJ1508CTB-27	10	36
M24243/6-A402H	1	6		25	5
	57	28		57	33
M45913/1-6CGS5C	22	1	SAEJ1508CTB-30	10	30
M45913/38CS6N	16	10	SAEJ1508CTB-42	10	28
M85049/38C-4A	55	59		10	32
M85049/39-23W	55	9	SAEJ1508CTB-58	8	10
M85049/39-25W	55	4	SAEJ1508CTB-67	8	6
MIL-S-46163A	BULK	30	SAEJ1508D11	57	24
MMF1203M06F16M4	21	4	SAEJ1508D9	57	20
MS20659-12	15	8	SAEJ1508F72	11	20
MS20659-41	17	23	SAEJ5144-8140239C	25	3
MS20659-9	17	28	SAEJ5144070221C	12	9
MS21333-126	55	79	SAEJ5144140109C	13	14
MS24523-31	2	22	SAEJ51442-140140B	13	12
MS2503-103	55	43	SAEJ5145-4070202C	13	13
MS25036-103	55	19	SAEJ5145-6070120C	12	6
MS25036-109	55	54	SAEJ5145070118C	11	2
MS25036-112	56	2	SAEJ5145070601B	11	42
MS25036-148	11	12	SAEJ5145070801B	11	10
	4	41	SAEJ5146-4080102C	12	10
MS25036-155	19	37	SAEJ58	24	39

PART NUMBER	FIG.	ITEM	PART NUMBER	FIG.	ITEM
TAG22T3-100B	19	45			
	21	15			
TAG26T6-100B	19	22A			
	19	22			
	19	36			
	55	10			
TAG38T4-100B	55	85			
TAG3T3-100B	55	11			
	56	18			
TAG9T3-100B	21	21			
	55	26			
TFT-250-16	BULK	21			
W12S	21	22			
W2S	55	28			
W35	18	13			
W3S	55	21			
W8S	55	71			
XV501P-12	26	13			

END OF WORK PACKAGE

CHAPTER 7

FIELD AND SUSTAINMENT SUPPORTING INFORMATION

FOR

AMMPS 5 KW GENERATOR SET

REFERENCES

SCOPE

This WP lists all the field manuals, forms, technical manuals, and miscellaneous publications referenced in this TM.

FIELD MANUALS

FM 4-25.11	First Aid
FM 5-424	Theater of Operations Electrical Systems

FORMS

AFI 21-101	Aircraft and Equipment Maintenance Management
AFI 33-201V2	Communications Security (COMSEC) User Requirements
AFI 38-401	The Air Force Innovative Development Through Employee Awareness (IDEA) Program
AFTO Form 22	Technical Manual (TM) Change Recommendation and Reply
AR 25-30	The Army Publishing Program
AR 700-138	Army Logistics Readiness and Sustainability
CTA 50-909	Field and Garrison Furnishings and Equipment
CTA 50-970	Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items)
CTA 8-100	Army Medical Department Expendable/Durable Items
DA Form 2028	Recommended Changes to Publications and Blank Forms
DA Form 2258	Depreservation Guide for Vehicles and Equipment
DA Form 2402	Exchange Tag
DA Form 2404	Equipment Inspection and Maintenance Worksheet
DA Form 5988E	Equipment Inspection and Maintenance Worksheet (electronic version)
DA PAM 738-751	Functional Users Manual for The Army Maintenance Management System – Aviation (TAMMS-A)
DA PAM 750-8	The Army Maintenance Management System (TAMMS) Users Manual
DD Form 361	Transportation Discrepancy Report (TDR)
MCO P4855.10	Product Quality Deficiency Report (PQDR)
NAVMC Form 10772	Recommended Changes to Publications/Logistics-Maintenance Data Coding
SF 368	Product Quality Deficiency Report (PQDR)

TECHNICAL MANUALS

TM 1-1500-344-23	Aircraft Weapon Systems Cleaning and Corrosion Control
TM 4700-15/1	Tactical Equipment Records Procedures
TM 750-244-2	Procedures for Destruction of Electronics Materiel to Prevent Enemy Use (Electronics Command)
TM 9-6115-749-10	Operator's Manual For Generator Set, Skid Mounted 5 kW Advanced Medium Mobile Power Sources (AMMPS)
TM 9-6115-755-13&P	Operator and Field Maintenance Manual Including Repair Parts and Special Tools List For Trailer Mounted AMMPS 5 kW
TO 00-20	Series of Technical Orders
TO 00-5-1	AF Technical Order System

MISCELLANEOUS DOCUMENTS

A-A-52557	Commercial Item Description: Fuel Oil, Diesel; for Posts, Camps and Stations
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MISCELLANEOUS DOCUMENTS – CONTINUED

A-A-52624A NOTICE 1	Commercial Item Description: Antifreeze, Multi-engine Type
DOD Directive 5230.25	Withholding of Unclassified Technical Data From Public Disclosure
MIL-A-53009A	Military Specification, Additive, Antifreeze Extender, Liquid Cooling Systems
MIL-C-0010597F(ME)	Military Specification, Cleaning Compound with Conditioner for Engine Cooling Systems
MIL-PRF-2104H	Performance Specification, Lubrication Oil, Internal Combustion Engine, Combat/Tactical Service
MIL-PRF-21260E	Performance Specification, Lubrication Oil, Internal Combustion Engine, Preservative Break-in
MIL-PRF-22191	Performance Specification, Barrier Materials, Transparent, Flexible, Heat-Sealable
MIL-PRF-29608	Performance Specification, Cleaning and Cleaning-Lubricating Compounds, Electrical Contact, Low Ozone Depletion Potential
MIL-PRF-46167D NOTICE 1	Performance Specification, Lubrication Oil, Internal Combustion Engine, Arctic
MIL-PRF-680	Performance Specification, Degreasing Solvent
MIL-STD-129P w/Change 4	Military Marking Practices for Shipment and Storage
SAE-AMS-C-29602	Cleaning Compounds for Parts Washers and Spray Cabinets
SAE-AMS-T-22085	Tapes, Pressure-Sensitive, Adhesive, Preservation and Sealing
TB 43-0211	Army Oil Analysis Program (AOAP) Guide for Leaders and Users
TB 750-651	Use of Antifreeze Solutions, Antifreeze Extender, Cleaning Compounds, and Test Kit in Engine Cooling Systems
TB SIG 222	Solder and Soldering

END OF WORK PACKAGE

INTRODUCTION FOR STANDARD TWO-LEVEL MAC

MAINTENANCE ALLOCATION CHART (MAC)**INTRODUCTION****The Army Maintenance System MAC**

This introduction provides a general explanation of all maintenance and repair functions authorized at the two maintenance levels under the Two-Level Maintenance System concept.

This MAC (immediately following the introduction) designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component shall be consistent with the capacities and capabilities of the designated maintenance levels, which are shown on the MAC in column (4) as:

Field - includes two subcolumns, Crew (C) and Maintainer (F).

Sustainment - includes two subcolumns, Below Depot (H) and Depot (D).

The maintenance to be performed at field and sustainment levels is described as follows:

1. Crew maintenance. The responsibility of a using organization to perform maintenance on its assigned equipment. It normally consists of inspecting, servicing, lubricating, adjusting, and replacing parts, minor assemblies, and subassemblies. The replace function for this level of maintenance is indicated by the letter "C" in the third position of the SMR code. A "C" appearing in the fourth position of the SMR code indicates complete repair is possible at the crew maintenance level.
2. Maintainer maintenance. Maintenance accomplished on a component, accessory, assembly, subassembly, plug-in unit, or other portion either on the system or after it is removed. The replace function for this level of maintenance is indicated by the letter "F" appearing in the third position of the SMR code. An "F" appearing in the fourth position of the SMR code indicates complete repair is possible at the field maintenance level. Items are returned to the user after maintenance is performed at this level.
3. Below depot sustainment. Maintenance accomplished on a component, accessory, assembly, subassembly, plug-in unit, or other portion either on the system or after it is removed. The replace function for this level of maintenance is indicated by the letter "H" appearing in the third position of the SMR code. An "H" appearing in the fourth position of the SMR code indicates complete repair is possible at the below depot sustainment maintenance level. Items are returned to the supply system after maintenance is performed at this level.
4. Depot sustainment. Maintenance accomplished on a component, accessory, assembly, subassembly, plug-in unit, or other portion either on the system or after it is removed. The replace function for this level of maintenance is indicated by the letter "D" or "K" appearing in the third position of the SMR code. Depot sustainment maintenance can be performed by either depot personnel or contractor personnel. A "D" or "K" appearing in the fourth position of the SMR code indicates complete repair is possible at the depot sustainment maintenance level. Items are returned to the supply systems after maintenance is performed at this level.

The tools and test equipment requirements table (immediately following the MAC) lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from the MAC.

The remarks table (immediately following the tools and test equipment requirements) contains supplemental instructions and explanatory notes for a particular maintenance function.

Maintenance Functions

Maintenance functions are limited to and defined as follows:

MAINTENANCE ALLOCATION CHART (MAC) – CONTINUED

1. **Inspect.** To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel). This includes scheduled inspection and gaugings and evaluation of cannon tubes.
2. **Test.** To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards on a scheduled basis, i.e., load testing of lift devices and hydrostatic testing of pressure hoses.
3. **Service.** Operations required periodically to keep an item in proper operating condition; e.g., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases. This includes scheduled exercising and purging of recoil mechanisms. The following are examples of service functions:
 - a. **Unpack.** To remove from packing box for service or when required for the performance of maintenance operations.
 - b. **Repack.** To return item to packing box after service and other maintenance operations.
 - c. **Clean.** To rid the item of contamination.
 - d. **Touch up.** To spot paint scratched or blistered surfaces.
 - e. **Mark.** To restore obliterated identification.
4. **Adjust.** To maintain or regulate, within prescribed limits, by bringing into proper position, or by setting the operating characteristics to specified parameters.
5. **Align.** To adjust specified variable elements of an item to bring about optimum or desired performance.
6. **Calibrate.** To determine and cause corrections to be made or to be adjusted on instruments of test, measuring, and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.
7. **Remove/Install.** To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.
8. **Paint (ammunition only).** To prepare and spray color coats of paint so that the ammunition can be identified and protected. The color indicating primary use is applied, preferably, to the entire exterior surface as the background color of the item. Other markings are to be repainted as original so as to retain proper ammunition identification.
9. **Replace.** To remove an unserviceable item and install a serviceable counterpart in its place "Replace" is authorized by the MAC and assigned maintenance level is shown as the third position code of the Source, Maintenance and Recoverability (SMR) code.
10. **Repair.** The application of maintenance services, including fault location/troubleshooting, removal/installation, disassembly/assembly procedures and maintenance actions to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

NOTE

The following definitions are applicable to the "repair" maintenance function:

Services. Inspect, test, service, adjust, align, calibrate, and/or replace.

MAINTENANCE ALLOCATION CHART (MAC) – CONTINUED**NOTE**

Fault location/troubleshooting. The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or Unit Under Test (UUT).

Disassembly/assembly. The step-by-step breakdown (taking apart) of a spare/functional group coded item to the level of its least component, that is assigned an SMR code for the level of maintenance under consideration (i.e., identified as maintenance significant).

Actions. Welding, grinding, riveting, straightening, facing, machining, and/or resurfacing.

11. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.
12. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (e.g., hours/miles) considered in classifying Army equipment/components.

Explanation of Columns in the MAC

Column (1) Group Number. Column (1) lists Functional Group Code (FGC) numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the Next Higher Assembly (NHA).

Column (2) Component/Assembly. Column (2) contains the item names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

Column (3) Maintenance Function. Column (3) lists the functions to be performed on the item listed in column (2). (For a detailed explanation of these functions refer to "Maintenance Functions" outlined above).

Column (4) Maintenance Level. Column (4) specifies each level of maintenance authorized to perform each function listed in column (3), by indicating work time required (expressed as manhours in whole hours or decimals) in the appropriate subcolumn. This work time figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function varies at different maintenance levels, appropriate work time figures are to be shown for each level. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the MAC. The symbol designations for the various maintenance levels are as follows:

Field:

C Crew maintenance

F Maintainer maintenance

Sustainment:

L Specialized Repair Activity (SRA)

MAINTENANCE ALLOCATION CHART (MAC) – CONTINUED

H Below depot maintenance

D Depot maintenance

NOTE

The "L" maintenance level is not included in column (4) of the MAC. Functions to this level of maintenance are identified by work time figure in the "H" column of column (4), and an associated reference code is used in the REMARKS column (6). This code is keyed to the remarks and the SRA complete repair application is explained there.

Column (5) Tools and Equipment Reference Code. Column (5) specifies, by code, those common tool sets (not individual tools), common Test, Measurement and Diagnostic Equipment (TMDE), and special tools, special TMDE and special support equipment required to perform the designated function. Codes are keyed to the entries in the tools and test equipment table.

Column (6) Remarks Code. When applicable, this column contains a letter code, in alphabetical order, which is keyed to the remarks table entries.

Explanation of Columns in the Tools and Test Equipment Requirements

Column (1) - Tool or Test Equipment Reference Code. The tool or test equipment reference code correlates with a code used in column (5) of the MAC.

Column (2) - Maintenance Level. The lowest level of maintenance authorized to use the tool or test equipment.

Column (3) - Nomenclature. Name or identification of the tool or test equipment.

Column (4) - National Stock Number (NSN). The NSN of the tool or test equipment.

Column (5) - Tool Number. The manufacturer's part number.

Explanation of Columns in the Remarks

Column (1) - Remarks Code. The code recorded in column (6) of the MAC.

Column (2) - Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC.

END OF WORK PACKAGE

STANDARD TWO-LEVEL MAC

Table 1. MAC for AMMPS 5 kW Generator Set.

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT REFERENCE CODE	(6) REMARKS CODE
			FIELD		SUSTAINMENT			
			CREW (C)	MAINTAINER (F)	BELOW DEPOT (H)	DEPOT (D)		
00	GENERATOR SET	Inspect	0.6	0.3			33 33	A
		Service		0.1				
		Repair		0.2				
		Overhaul						50
01	DC ELECTRI- CAL	Inspect	0.1	0.2			33 4, 10, 11, 22, 33 33	A
		Remove/Install		1.1				
		Repair		0.3				
		Test		0.1				D
0101	RELAY PANEL ASSEMBLY	Inspect	0.1				33 33 33 33	A
		Remove/Install		0.2				
		Repair		0.1				
		Test		0.1				
		Replace		0.2				E F
02	HOUSING	Inspect	0.1				16, 33 33, 35	A
		Remove/Install		4.2				
		Repair		0.2				G
03	DIGITAL CON- TROL SYSTEM (DCS)	Inspect	0.1	0.1			33 33 33	A
		Remove/Install		0.3				
		Repair		0.3				
		Test		0.2				
		Replace		0.2				H
0301	CONTROL PANEL ASSEMBLY	Inspect	0.1	0.1			33 25, 33 33 33	
		Remove/Install		0.4				
		Repair		0.3				
		Test		0.1				
		Replace		0.1				I J
0302	DCS ENCLO- SURE ASSEM- BLY	Inspect		0.1			33 25, 33	
		Remove/Install		0.4				
		Repair		1.0				K

Table 1. MAC for AMMPS 5 kW Generator Set. – Continued

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT REFERENCE CODE	(6) REMARKS CODE	
			FIELD		SUSTAINMENT				
			CREW (C)	MAINTAINER (F)	BELOW DEPOT (H)	DEPOT (D)			
		Test			0.5		33	L	
		Replace		0.2			33		
04	INTAKE AIR	Inspect	0.1	0.1				A	
		Service		0.2					
		Remove/Install		1.0					
		Replace		0.3					
05	EXHAUST	Inspect	0.1				33	A	
		Remove/Install		0.9					
		Replace		0.3					
06	COOLING SYSTEM	Inspect	0.1	0.3				N	
		Service		0.5			33		
		Remove/Install		4.7			33		
		Repair		0.5			33		
		Test		0.2			26		
		Replace		0.7			33		
07	FUEL SYSTEM	Inspect	0.1					A	
		Service		0.7			1.2	13, 15, 33, 41, 43	A
		Remove/Install		1.8			13, 15, 33, 41, 43		
		Repair		0.3			13, 15, 33, 41, 43	O	
0701	FUEL MANI- FOLD ASSEM- BLY	Inspect	0.1	0.2				A	
		Remove/Install		4.5			13, 33, 36, 38, 40, 41, 43		
		Repair		0.7			13, 33, 36, 38, 40, 41, 43		
		Test		0.5			33		
		Replace		0.4			13, 33, 36, 38, 40, 41, 43		
0702	FUELFIL- TER/WATER SEPARATOR	Inspect	0.1	0.1				A	
		Service		0.4			39	A	
		Remove/Install		2.1			33		
		Repair		0.4			33		
		Replace		2.1			33		

Table 1. MAC for AMMPS 5 kW Generator Set. – Continued

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT REFERENCE CODE	(6) REMARKS CODE
			FIELD		SUSTAINMENT			
			CREW (C)	MAINTAINER (F)	BELOW DEPOT (H)	DEPOT (D)		
08	OUTPUT BOX	Inspect Remove/Install Repair	0.1	0.2 1.0 0.4			33 33, 35	A
0801	CONTACTOR	Inspect Remove/Install Repair Test Replace		0.5 3.7 0.5 0.1 1.8			33, 43 10, 11, 22, 33, 43 33 33, 43	P
0802	OUTPUT TER- MINAL BOARD	Inspect Remove/Install Repair	0.1	0.7 0.2			33, 40, 41, 43 33, 40, 41, 43	A
0803	VOLTAGE SELECTION SWITCH	Inspect Remove/Install Repair Test Replace		0.1 1.0 0.2 0.2 0.5			33, 42, 43 10, 11, 22, 33, 42, 43 33, 42, 43	Q
0804	HOUR METER	Inspect Remove/Install Repair Test Replace	0.1	0.5 0.2 0.1 0.3			33, 42 10, 11, 22, 33, 42 33, 42 33, 42	A R
0805	CONVE- NIENCE RECEPTACLE	Inspect Remove/Install Repair Test Replace	0.1 0.1	0.6 0.2 0.1 0.3			23, 33, 42, 43 23, 33, 42, 43 33 23, 33, 42, 43	A S
0806	TRANSFORM- ERS	Inspect Remove/Install Repair		0.1 0.7 0.1			33, 42, 43 33, 35, 42, 43	T

Table 1. MAC for AMMPS 5 kW Generator Set. – Continued

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT REFERENCE CODE	(6) REMARKS CODE
			FIELD		SUSTAINMENT			
			CREW (C)	MAINTAINER (F)	BELOW DEPOT (H)	DEPOT (D)		
		Test		0.1			33	
		Replace		0.2			33, 42, 43	
0807	PRINTED CIR- CUIT BOARD MODULE	Inspect		0.1				A
		Remove/Install		0.6			25, 33, 41, 42	
		Repair		0.1			10, 11, 22, 25, 33, 41, 42	U
		Test		0.2			25, 33	
		Replace		0.3			25, 33, 41, 42	
09	POWER PLANT	Inspect	0.1	0.1				A
		Remove/Install		2.6			33, 43	
		Repair		0.3			33, 43	V
		Replace		4.0			33, 43	
0901	AC GENERA- TOR ASSEM- BLY	Inspect	0.1	1.0				A
		Remove/Install		4.7			21, 33, 36, 37, 43	
		Repair		1.5	12.0		10, 11, 21, 22, 33, 36, 37, 43	W
		Test		1.0			21, 33, 43	
		Replace		2.0			21, 33, 36, 37, 43	
0902	ENGINE ASSEMBLY	Inspect	0.2	0.4				A
		Service	0.1	0.3				
		Remove/Install		4.0			33, 40, 43	
		Repair		1.3	3.5			
		Test		1.0				
		Adjust		1.0				
		Replace		2.2				
		Overhaul			11.0			
090201	LUBRICATION SYSTEM	Inspect	0.1	0.1				A
		Service		0.3			33, 39	A
		Remove/Install		1.2			33, 39	
		Repair		0.4			33, 39	
		Test		0.1			33	

Table 1. MAC for AMMPS 5 kW Generator Set. – Continued

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT REFERENCE CODE	(6) REMARKS CODE	
			FIELD		SUSTAINMENT				
			CREW (C)	MAINTAINER (F)	BELOW DEPOT (H)	DEPOT (D)			
		Replace		0.6			33, 35, 39	X	
090202	ENGINE SPEED SEN- SOR	Inspect	0.1	0.1				33 33 33	
		Remove/Install		0.9					
		Adjust		0.4					
		Replace		0.1					
090203	GLOW PLUGS	Inspect		0.1				24, 33, 43 33 24, 33, 43	
		Remove/Install		0.8					
		Test		0.3					
		Replace		0.5					
090204	FUEL INJEC- TOR	Inspect	0.1	0.2				13, 33, 41 13, 33, 41 17, 30 13, 33, 41	Y
		Remove/Install		2.5					
		Repair		0.3					
		Test		0.4					
		Replace		1.1					
090205	SPEED CON- TROL PLATE	Inspect	0.1					19, 33 33 19, 33	
		Remove/Install		0.7					
		Adjust		0.3					
		Replace		0.6					
090206	FUEL INJEC- TION PUMP	Inspect						15, 20, 33 15, 20, 33 33 33 15, 20, 33	A Z
		Remove/Install		6.3					
		Repair		0.2					
		Test		0.5					
		Adjust		0.3					
		Replace		3.4					
090207	THERMOSTAT	Inspect		0.2				33 33 33 33	AA
		Remove/Install		1.2					
		Repair		0.2					
		Test		0.5					
		Replace		0.5					
090208	WATER PUMP	Inspect	0.1	0.2				A	

Table 1. MAC for AMMPS 5 kW Generator Set. – Continued

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT REFERENCE CODE	(6) REMARKS CODE	
			FIELD		SUSTAINMENT				
			CREW (C)	MAINTAINER (F)	BELOW DEPOT (H)	DEPOT (D)			
		Remove/Install		1.5			15, 33	BB	
		Repair		0.2			15, 33		
		Replace		1.3			15, 33		
090209	BAT- TERRY-CHARG- ING ALTER- NATOR AND BELT	Inspect	0.1	0.1				A	
		Service		0.2			33, 41		A
		Remove/Install		0.9			33, 41		
		Adjust		0.2			33, 41		
		Test		0.5			33		
		Replace		0.9			33, 41		
090210	STARTER	Inspect		0.1				A	
		Remove/Install		0.7			33	CC	
		Repair		0.2			10, 11, 22, 33		
		Test		0.2			33		
		Replace		0.5			33		
090211	GOVERNOR ACTUATOR	Inspect		0.1			33	A	
		Remove/Install		0.7			33		
		Test		0.1			33		
		Replace		0.4			33		
090212	INTAKE MANI- FOLD	Inspect	0.1	0.1				A	
		Remove/Install		1.0			15, 33, 41		
		Replace		0.5			15, 33, 41		
090213	EXHAUST MANIFOLD	Inspect	0.1	0.1				A	
		Remove/Install		2.0			33		
		Replace		1.4			33		
090214	OIL PAN AND STRAINER	Inspect	0.1	0.1				A	
		Remove/Install		4.5			15, 33		
		Replace		0.7			15, 33		
090215	FLYWHEEL	Inspect		0.4					
		Remove/Install		16.3			33, 41		

Table 1. MAC for AMMPS 5 kW Generator Set. – Continued

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT REFERENCE CODE	(6) REMARKS CODE
			FIELD		SUSTAINMENT			
			CREW (C)	MAINTAINER (F)	BELOW DEPOT (H)	DEPOT (D)		
		Replace		0.4			33, 41	
090216	CRANKCASE REAR BEAR- ING CASE COVER	Inspect		0.1				A
		Remove/Install		17.5			33	
		Repair		0.5			33	
		Replace		0.7			33	
090217	CYLINDER HEAD ASSEM- BLY	Inspect		0.2				A
		Remove/Install		4.5			33	
		Repair		0.5	4.2		33	
		Test		2.1	1.1		1, 29, 33, 41	
		Replace		1.1			33	
09021701	VALVE COVER	Inspect	0.1	0.1				A
		Remove/Install		1.5			33, 43	
		Repair		0.2			33, 43	
		Replace		0.6			33, 43	
09021702	ENGINE VALVES	Inspect		0.1	0.3			A
		Remove/Install			0.9		33	
		Adjust		0.8			33	
		Replace			0.9		33	
09021703	ROCKER ARMS AND PUSH RODS	Inspect			0.1			EE
		Remove/Install			1.8		33, 41	
		Repair			1.8		33, 41	
		Adjust			1.0			
		Replace			1.8		33, 41	
090218	SHORT BLOCK ASSEMBLY	Replace			5.0		33, 41	A
		Remove/Install		0.7			33, 41	
		Repair			10.0		33, 41	
		Replace			6.0		33, 41	

Table 1. MAC for AMMPS 5 kW Generator Set. – Continued

(1)	(2)	(3)	(4)				(5)	(6)
GROUP NUMBER	COMPONENT/ ASSEMBLY	MAINTENANCE FUNCTION	MAINTENANCE LEVEL				TOOLS AND EQUIPMENT REFERENCE CODE	REMARKS CODE
			FIELD		SUSTAINMENT			
			CREW (C)	MAINTAINER (F)	BELOW DEPOT (H)	DEPOT (D)		
09021801	CONNECTING RODS AND PISTONS	Inspect			0.2			FF
		Remove/Install			7.0		33, 41	
		Repair			8.0		33, 41	
		Test			0.5		33	
		Replace			7.0		33, 41	
09021802	CRANKSHAFT	Inspect			0.2			GG
		Remove/Install			8.0		33, 41	
		Repair			9.0		33, 41	
		Test			0.5			
		Replace			8.0		33, 41	
09021803	GEAR CASE COVER	Inspect		0.1				A
		Remove/Install		2.0			33	
		Repair		0.5			33	
		Replace		2.0			33	
09021804	HARMONIC BALANCER	Inspect		0.1				
		Remove/Install		0.6			33	
		Replace		0.5			33	
09021805	CAMSHAFT AND GEAR	Inspect			0.2			
		Remove/Install			1.5		33, 41	
		Repair			1.0		33, 41	
		Test			0.5			
		Adjust			0.5			
Replace			1.5		33, 41			
09021806	IDLER GEAR	Inspect			0.2			
		Remove/Install			1.5		33, 41	
		Repair			1.0		33, 41	
		Replace			1.5		33, 41	
09021807	FUEL CAMSHAFT AND FORK ASSEMBLY	Inspect			0.3			
		Remove/Install			0.8		33, 41	

Table 1. MAC for AMMPS 5 kW Generator Set. – Continued

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT REFERENCE CODE	(6) REMARKS CODE
			FIELD		SUSTAINMENT			
			CREW (C)	MAINTAINER (F)	BELOW DEPOT (H)	DEPOT (D)		
		Repair			0.4		33, 41	
		Replace			0.8		33, 41	
09021808	OIL PUMP AND GEAR	Inspect			0.1			
		Remove/Install			1.5		33, 43	
		Test			0.5		28, 33, 43	
		Replace			1.5		33, 43	
10	ENGINE (MAIN) WIRING HAR- NESS	Inspect	0.1	0.1				A
		Remove/Install		3.5			33	
		Repair		0.5			33, 35	HH
		Test		0.2			33	
		Replace		1.3			33	
11	POWER WIRING HAR- NESS	Inspect	0.1	0.2				A
		Remove/Install		1.0			33	
		Repair		0.5			10, 11, 22, 33	II
		Test		0.1			33	
		Replace		0.9			33	
12	WINTERIZA- TION KIT	Inspect	0.1	0.1				A
		Remove/Install		2.0			33	
		Repair		0.5			33, 35	
		Test		0.3			3, 33	
		Replace		1.0			33	

Table 2. Tools and Test Equipment Requirements for AMMPS 5 kW Generator Set.

TOOLS OR TEST EQUIPMENT	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL STOCK NUMBER	TOOL NUMBER
1	F	Adapter, Compression Test	4910-01-604-2735	KUB5ENGCOMAD
2	F	Bank, Load		G76852
3	F	Beaker, Laboratory	6640-00-957-5578	1080-500

Table 2. Tools and Test Equipment Requirements for AMMPS 5 kW Generator Set. – Continued

TOOLS OR TEST EQUIPMENT	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL STOCK NUMBER	TOOL NUMBER
4	O	Cable, Auxiliary with NATO Plug	6520-01-499-3317	4202042
5	F	Cable, Local Control	6150-01-608-2505	04-21227
6	F	Cable, Remote Control	6110-01-596-7719	04-21226-1
7	F	Cable, Remote Control	6150-01-608-2635	04-21226-2
8	F	Caliper, Vernier, 0-6 in		KTC S0999
9	F	Clamp, Vise-Grip, 11 in Swivel Pad, Weld Type	5120-01-336-7977	11SP
10	F	Crimping, Tool, Terminal		KTC S0159
11	F	Crimping, Tool, Terminal, Hand	5120-01-374-8936	J-38852
12	F	Crowfoot Attachment Set, Socket Wrench, Flare Nut, Metric		KTC S0170
13	F	Crowfoot Attachment Set, Socket Wrench, Flare Nut, Standard		KTC S0161
14	F	Forward Repair System	4940-01-533-1621	SC 4940-95-E42
15	F	Hammer, Hand, Soft Face, Dead Blow		KTC S0221
16	F	Hex Key 5.0 mm		KTC S6328
17	F	Kit, Nozzle	4730-01-561-9098	DT-6022
18	F	Oiler, Hand		50-573
19	F	Pick, Dental	6520-01-353-9942	H-10401
20	F	Pick, Miniature	5120-01-428-7836	SG4ASHBR
21	F	Puller Set, Mechanical		KTC S0221
22	F	Remover, Electrical Contact	5120-01-158-4707	114010
23	F	Screwdriver, Torx, T20, 3 in Long		KTC S0342
24	F	Socket, Impact Wrench, 3/8 in Dr, 6Pt, Deep, 10 mm	5120-01-354-5977	KTC S0892
25	F	Strap, Wrist, Electrostatic Discharge	5920-01-491-3509	4720
26	F	Test Kit, Radiator Pressure		KTC S0698
27	F	Test Set, Electronic Systems	6625-01-493-8968	13580880
28	F	Test Set, Oil Systems Pressure	6685-01-604-2696	3289

Table 2. Tools and Test Equipment Requirements for AMMPS 5 kW Generator Set. – Continued

TOOLS OR TEST EQUIPMENT	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL STOCK NUMBER	TOOL NUMBER
29	F	Tester, Cylinder Compression	4910-01-562-4340	MT33C
30	F	Tester, Diesel Fuel Injector Nozzle	4910-00-910-6666	DT1300
31	F	Thermometer, Self-Indicating	6685-00-242-2184	ASTM 10F
32	F	Tool Kit, Blind, Fastener, Installation	5180-01-470-6539	KTC S0700
33	F	Tool Kit, General Mechanic's (GMTK)	5180-01-548-7634	SC 5180-95-B48
34	F	Tool Set, SATS, Base	4910-01-490-6453	SC 4910-95-A81
35	F	Tool, Rivet Nut	4910-01-605-6009	01METRIC
36	F	Torque Tube, 5-75 ft•lb	5120-01-603-9678	64-154
37	F	Torque Wrench Head End, 1/4x3/8 in Drive, 9/16 in	5120-01-603-9691	64-308
38	F	Torque Wrench Head End, 1/4x3/8 in Drive, 5/8 in	5120-01-603-9692	64-309
39	F	Wrench, Oil Filter, Strap		KTC S0982
40	F	Wrench, Torque, Click, Ratcheting, 1/2 in Drive, 250 ft•lb		KTC S0991
41	F	Wrench, Torque, Click, Ratcheting, 3/8 in Drive, 75 ft•lb		KTC S0989
42	F	Wrench, Torque, Dial, 1/4 in Drive, 30 in•lb	5120-01-617-8007	KTC S0986
43	F	Wrench, Torque, Dial, 3/8 in Drive, 300 in•lb		KTC S0987

Table 3. Remarks for AMMPS 5 kW Generator Set.

REMARK CODE	REMARKS
A	Preventive Maintenance Checks and Services (PMCS)
B	Generator set repair includes replacement of identification plates, lifting eyes, clinch nuts, and repair of control harness.
C	DC Electricalal Installation repair includes the replacement of batteries, battery cables, NATO slave receptacle, main DC circuit breaker, and DEAD CRANK SWITCH.
D	DC Electricalal Installation test includes testing of batteries, main DC circuit breaker, and DEAD CRANK SWITCH.
E	Relay Panel Assembly repair includes replacement of circuit breakers and relays.

Table 3. Remarks for AMMPS 5 kW Generator Set. – Continued

REMARK CODE	REMARKS
F	Relay Panel Assembly test includes testing of circuit breakers and relays.
G	Housing Installation repair includes the replacement of access doors, panels, door latches, hinges, brackets, access covers, clinch nuts, and repair of electrical leads.
H	DCS Installation repair includes replacement of the control box assembly, control box gasket, DCS enclosure assembly, and DCS control panel assembly.
I	DCS Control Panel Assembly repair includes replacement of cable assemblies, switches, control panel, membrane assembly, gaskets, LCD display, panel heater, and circuit card assemblies.
J	DCS Control Panel Assembly test includes testing of switches and circuit card assemblies.
K	DCS Enclosure Assembly repair includes replacement of cable assemblies, gaskets, and circuit card assemblies.
L	DCS Enclosure Assembly test includes testing of circuit card assemblies.
M	Intake Air and Installation Inspect and service functions include the inspection and servicing of the service indicator, hose assemblies, and filter element.
N	Cooling System Installation repair includes the replacement of the radiator assembly, coolant tank assembly, and cooling fan.
O	Fuel System Installation repair function includes the replacement of the tank assembly and fuel system module.
P	Contactor repair includes the replacement and repair of electrical leads.
Q	Voltage Selection Switch repair includes the replacement and repair of electrical leads.
R	Hour Meter repair includes the replacement and repair of the wiring harness.
S	Convenience Receptacle Assembly repair includes replacement and repair of the cable assemblies.
T	Transformers repair includes replacement of clinch nuts.
U	Printed Circuit Board Module repair includes the replacement and repair of electrical leads and wiring harnesses.
V	Power Plant Installation repair includes the replacement of the engine assembly and AC generator assembly.
W	AC Generator Assembly repair includes the replacement and repair of the end bell assembly, stator assembly, rotor assembly, and exciter rotor assembly.
X	Lubrication System repair includes replacement and repair of the oil drain hose bulkhead assembly and dipstick tube assembly.
Y	Fuel Injector repair includes the replacement of the fuel injector assembly and hose assemblies.
Z	Fuel Injection Pump repair includes the replacement of shims.
AA	Thermostat Installation repair includes the replacement of the thermostat and temperature sensor.

Table 3. Remarks for AMMPS 5 kW Generator Set. – Continued

REMARK CODE	REMARKS
BB	Water Pump repair includes the replacement of the fan pulley.
CC	Starter repair includes the replacement and repair of the electrical lead.
DD	Valve Cover repair includes the replacement and repair of the cylinder head assembly cover.
EE	Rocker Arms and Push Rods repair includes the replacement and repair of the rocker assembly.
FF	Connecting Rods and Pistons repair includes the replacement and repair of the piston assembly and connecting rod assembly.
GG	Crankshaft repair includes the replacement and repair of the crankshaft, bearing case assembly, bearing assemblies, and oil slinger assembly.
HH	Engine Wiring Harness repair includes the replacement and repair of connector assemblies.
II	Power Wiring Harness repair includes the replacement and repair of connector assemblies.
JJ	Generators with high wear due to age (approaching or exceeding 10 years) or high operating hours (approaching or exceeding 7000 hrs) may display unsatisfactory reliability and performance and are candidates to be overhauled to restore reliability to a satisfactory level and extend the service life of the generator. Generators that need repairs which exceed the MEL published in TB 43-0002-32, are also candidates for Overhaul.

END OF WORK PACKAGE

EXPENDABLE AND DURABLE ITEMS LIST

INTRODUCTION**Scope**

This work package lists expendable and durable items that you will need to operate and maintain the AMMPS 5 kW Generator Set. This listing is for information only and is not authority to requisition the listed items. These items are authorized to you by Common Table of Allowances (CTA) 50-790, Expendable/Durable Items (Except Medical, Class V Repair Parts, and Heraldic Items), CTA 50-909, Field and Garrison Furnishings and Equipment or CTA 8-100, Army Medical Department Expendable/Durable Items.

Explanation of Columns in the Expendable/Durable Items List

Column (1) Item No. This number is assigned to the entry in the list and is referenced in the narrative instructions to identify the item (e.g., "Use brake fluid, (WP 0098, Item 5)").

Column (2) Level. This column identifies the lowest level of maintenance that requires the listed item.

Column (3) National Stock Number (NSN). This is the NSN assigned to the item which you can use to requisition it.

Column (4) Item Name, Description, Part Number/(CAGEC). This column provides the other information you need to identify the item. The last line below the description is the part number and the Commercial and Government Entity Code (CAGEC) (in parentheses).

Column (5) U/I. Unit of Issue (U/I) code shows the physical measurement or count of an item, such as gallon, dozen, gross, etc.

Table 1. Expendable and Durable Items List.

(1) ITEM NO.	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, PART NUMBER/(CAGEC)	(5) U/I
1	F	6810-00-201-0906	Alcohol, denatured, 16 oz 837015 (19203)	BT
2	C	6850-00-664-1403	Antifreeze, ethylene glycol, 1 gal A-A-52624 (58536)	GL
3	F	8145-01-440-3417	Bag, barrier 11509521 (18876)	EA
4	H	8950-01-407-9105	Baking soda 01900 (90038)	EA
5	F	7920-00-514-2417	Brush, acid swabbing 803-12 (7S147)	GR
6	F	5120-01-371-9268	Brush, battery terminal BTC3A (55719)	EA
7	C	7920-01-127-4376	Brush, wire, scratch, brass wire 71966 (76169)	EA

Table 1. Expendable and Durable Items List. – Continued

(1) ITEM NO.	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, PART NUMBER/(CAGEC)	(5) U/I
8	C	5340-00-450-5718	Cap set, protective, dust and moisture seal 10935405 (19207)	EA
9	H	6850-01-053-2540	Cleaning compound, engine cooling system MACS SUPER FAST FLUSH 1500 (72527)	BT
10	F	6850-01-474-2317	Cleaning compound, solvent BT05 (0K209)	CO
11	C	5350-00-221-0872	Cloth, abrasive, crocus ANSI B74.18 (80204)	PG
12	C	7920-01-482-6042	Cloth, cleaning, electronics 792000NIB0395 (1A920)	BX
13	F	8030-00-105-0270	Compound, antiseize, 1 lb can with brush top NSBT-16N (5W425)	CN
15	C	8030-01-508-9181	Compound, sealing 5699 (05972)	TU
14	F	8030-01-396-3362	Compound, sealing, 50 mL bottle 68035 (05972)	BT
16	F	7930-00-068-1669	Detergent, general purpose P-D-1747 (81348)	BX
17	C	6810-00-107-1510	Distilled water, ACS O-C-265 (81348)	DR
18	C	9140-00-286-5286	Fuel, diesel, DF-1 AA52557-1 (58536)	GL
19	C	9140-00-286-5294	Fuel, diesel, DF-2 AA52557-2 (58536)	GL
20	C	9150-01-179-1589	Grease, electrically conductive BEMS 15030 (59364)	CA
21	C	9150-00-929-7946	Grease, general purpose G-60/EPV (76736)	CA
22	F	6850-01-160-3868	Inhibitor, corrosion, liquid cooling system MIL-A-53009 (81349)	QT
23	C	9150-00-189-6727	Lubricating oil, engine, 1 qt MIL-PRF-2104H OE/HDO-10, 10W/QT/CN/2104 (13873)	QT

Table 1. Expendable and Durable Items List. – Continued

(1) ITEM NO.	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, PART NUMBER/(CAGEC)	(5) U/I
24	C	9150-01-518-9477	Lubricating oil, engine, 1 qt MIL-PRF-2104H OE/HDO-15/40, MIL-PRF-2104 (81349)	QT
25	C	9150-00-402-2372	Lubricating oil, engine, arctic 5 gal, -65 °F (-54 °C) MIL-PRF-46167 (81349)	CN
26	H	9150-00-111-3199	Lubricating oil, engine, preservation 5 gal MIL-PRF-21260 (81349)	CN
27	H	7920-01-430-5028	Pad, scouring 048011-04028 gray 6x9 in (27293)	EA
28	H	4910-01-490-6453	Pan, drain KTC S0255 (00NS2)	EA
29	H	9150-00-261-7899	Penetrating oil VV-P-216 (81348)	PT
30	H	8030-00-082-2508	Primer, sealing compound 74755 (05972)	BT
31	C	7920-00-205-3571	Rag, wiping DDD-R-0030 (81348)	BX
32	F	8030-01-465-1390	Sealant 56507 (05972)	EA
33	C	8520-01-133-8099	Soap, Ivory 7385T11 (39428)	EA
34	H	5975-00-074-2072	Strap, tiedown, electrical components PLT2SC (06383)	HD
35	C	9905-00-537-8954	Tag, marker, 50 each bundle 9905-00-537-8954 (64067)	BD
36	C	7510-00-117-5520	Tape, pressure sensitive, black conforming to SAE- AMS-T-22085 481 (52152)	RO
37	C	8135-01-054-0738	Wire, tie TIEWIRE16GA3-1/2LB (56319)	CL

END OF WORK PACKAGE

MAINTENANCE AND DEFERRED MAINTENANCE ITEMS LIST

GENERAL INFORMATION

This WP lists all maintenance items, as well as deferred maintenance items, displayed by the DCS and their corresponding maintenance prompts and intervals. The interval displayed on the DCS refers to operating hours remaining until the corresponding maintenance prompt is due for maintenance. The interval in Table 1 represents the total time interval in operating hours for a maintenance item. When a maintenance prompt is deferred, a deferred maintenance item code appears within the operating hours interval given in Table 2. Maintenance items provide operator feedback in conjunction with fault and warning codes (WP 0006, Warning and Fault Codes).

Table 1. Maintenance Item Codes and Prompts.

CODE	INTERVAL (H OR CALENDAR)	MAINTENANCE PROMPT
5001	50.0	[First change engine oil and filter]
5002	500.0 or 6 months	[Change engine oil and filter]
5003	500.0 or 6 months	[Change fuel filter/water separator]
5004	500.0 or 6 months	[Replace air filter]
5005	1500.0 or 1 year	[Drain coolant and flush system]
5006	500.0 or 6 months	[Inspect Aux Fuel Filter]
5007	1500.0 or 2 years	[Engine Valve check/adjust]
5008	1500.0	[Engine fuel injection nozzles check]
5009	500.0 or 6 months	[Inspect radiator cap for damage]
5010	500.0	[Replace drive belts]
5011	24.0	[Perform Daily Preventative Maintenance]
5014	1 year	[Inspect and Test Winterization Kit]
5015	500.0 or 6 months	[Check Voltage Selector Switch Operation]
5016	250.0 or 3 months	[Test and Reset GFI Receptacle]
5017	250.0 or 3 months	[Clean Radiator, Breather, Chrg Air/Fuel Coolers]

Table 2. Deferred Maintenance Item Codes and Prompts.

CODE	INTERVAL (H)	MAINTENANCE PROMPT
6001	24.0	[First change engine oil and filter]
6002	48.0	[Change engine oil and filter]
6003	48.0	[Change fuel filter/water separator]
6004	48.0	[Replace air filter]
6005	72.0	[Drain coolant and flush system]
6006	48.0	[Inspect Aux Fuel Filter]
6007	72.0	[Engine Valve check/adjust]

GENERAL INFORMATION – CONTINUED**Table 2. Deferred Maintenance Item Codes and Prompts. – Continued**

CODE	INTERVAL (H)	MAINTENANCE PROMPT
6008	72.0	[Engine fuel injection nozzles check]
6009	48.0	[Inspect radiator cap for damage]
6010	72.0	[Replace drive belts]
6011	12.0	[Perform Daily Preventative Maintenance]
6014	72.0	[Inspect and Test Winterization Kit]
6015	48.0	[Check Voltage Selector Switch Operation]
6016	24.0	[Test and Reset GFI Receptacle]
6017	24.0	[Clean Radiator, Breather, Chrg Air/Fuel Coolers]

END OF WORK PACKAGE

GLOSSARY

Term	Definition
24 VDC electrical system	A system used to create and maintain 24 VDC to power the generator set. The system includes two 12 VDC batteries, a battery-charging alternator rotated by an engine driven V-belt, and the required wiring and support components.
AC CIRCUIT INTERRUPT switch	This switch controls the operation of the AC contactor, which allows the generator set to be connected or disconnected to the load or switch box.
AC electrical system	This is the system that supplies AC from the generator set to the load. The power is generated by the AC generator and transferred to the load via the output box.
AMMPS	Newest generation of battlefield electric power supply.
Automatic Voltage Regulator (AVR)	Electrical regulator designed to automatically maintain a constant voltage level. Important component in synchronous generators, it controls the output voltage of the generator by controlling its excitation.
BATTLESHORT switch	This switch is placed in the ON position during situations when constant power is required without disruption; it allows the system to override faults/warnings that would normally shutdown the generator set. In normal operation, the BATTLESHORT switch will be in the OFF position to protect the generator set.
Battery-Charging alternator	A small, engine-mounted power generator that creates 24 VDC when rotated by an engine-driven belt.
Battery-Charging alternator V belt	The engine-driven belt that rotates the battery-charging alternator.
Battleshort	A condition in which some military equipment can be placed so it does not shut down when circumstances would be damaging to the equipment or personnel.
CARC	The CARC paint is used on the housing assembly for the generator set to protect it from the environment.
CAUTION	A notation in the manual that informs the reader that possible damage to the machine may occur if conditions listed are not met.
Convenience receptacle	A plug-in 110 VAC electrical outlet mounted at the rear of the generator set similar to the one used in a typical American home.
DCS	The DCS, which is located at the rear of the generator set, is a microprocessor-based control that allows the operator and maintainer to start/stop the generator set, operate the contactor, adjust voltage and frequency, clear/reset generator faults, and perform other necessary functions to provide power. Contains three components: control box, control board assembly, and front panel assembly.
DCS screen	LCD with a menu-driven display format to control generator set operations.
Engine control switch	This switch provides the local control for the generator set. The engine control switch has four positions: OFF, PRIME & RUN AUX FUEL, PRIME & RUN, and RUN.
Exhaust side	The side of the engine where the exhaust manifold is mounted.
External fuel system	The system that allows fuel to be pumped from a holding device not attached to the generator set, into the generator set fuel tank.

GLOSSARY – CONTINUED

Fault code	A message displayed on the DCS when a mechanical fault is detected. The code is displayed as a number followed by a short descriptive message.
Flywheel end	The end of the engine where the flywheel is mounted.
Front	When used to describe a direction in relation to the generator set, the front is the end of the generator set opposite of the DCS.
Fuel pump, auxiliary	Fuel pump used to pump fuel from an external source to the internal fuel tank of the generator set.
Fuel pump, main	Fuel pump used to pump fuel from the internal fuel tank of the generator set to the engine.
Glow plug	A 24 VDC electric heater mounted to the engine intake manifold used to heat incoming air to reduce start-up time in cold weather.
Glow plug relay	The electrical switch that controls the operation of the intake air heater.
Inspect	A method (usually visual) used to determine damage to a component.
Intake side	The side of the engine where the intake manifold is mounted.
Internal fuel system	The system housed within the generator set to fuel the engine. This includes the fuel tank, main fuel pump, fuel/water separator, and the required lines, fittings, and other components.
Left-side	The side of the machine that houses the intake air grille and a forward door. As the operator stands directly facing the DCS looking out, over the generator set, the side of the machine to the users left is the left-side.
Mode I	Mode I refers to the output of the generator set expressed in cycles per seconds (Hz). Mode I is a 50/60 Hz machine.
Mode II	Mode II refers to the output of the generator set expressed in cycles per seconds (Hz). Mode II is a 400 Hz machine.
NOTE	A notation in the manual that provides the reader helpful information that will assist in the completion of a maintenance task.
Ohm	The ohm is a unit of electrical resistance. One V will cause a current of 1 A to flow through a resistance of 1 Ω .
Phase	Phase refers to the windings of an AC generator.
Power Plant (PP)	This is two AMMPS generator sets hooked up in parallel with the use of a switch box.
Power Unit (PU)	This is a single AMMPS generator set.
Rear	The end of the machine where the DCS is mounted.
Remove	A maintenance task to remove a component from the generator set.
Repair	A maintenance task to restore a component to operational condition, usually by disassembly, parts replacement, and re-assembly of the component.
Replace	A maintenance task to remove a component from the generator set with no intent to re-install the same component. The original component is to be disposed of and replaced with new component.

GLOSSARY – CONTINUED

Right-Side	The side of the machine that houses the output box and a forward door. As the operator stands directly facing the DCS looking out, over the generator set, the side of the machine to the users right is the right-side.
Service	A maintenance task performed, usually on a scheduled basis, to restore or replenish items consumed during normal operation.
Soft key buttons	The soft button keys are located below the display panel on the DCS. The function of each button varies with the soft key function on the display panel.
Test	A maintenance task to determine if a component is performing correctly or to specification.
Volt	A unit of electrical potential. A potential of 1 V will cause a current of 1 A to flow through a resistance of 1 Ω .
WARNING	A notation in the manual that informs the reader that possible personal injury or death may occur if conditions listed are not met.
Warning code	A message displayed on the DCS when a mechanical fault is detected that, if the cause is left untreated, will cause damage to the equipment. The code is displayed as a number followed by a short descriptive message.
Water pump end	The end of the engine where the water pump is mounted.
Watt	A unit of electrical power. In DC circuits, wattage equals voltage multiplied by amperage. In AC circuits, wattage equals effective voltage multiplied by effective amperage multiplied by power factor multiplied by a constant dependent on the number of phases. 1,000 W are equal to 1 kW.
Wetstacking	Is caused by operating a diesel engine at very low loads. The engine doesn't reach full operating temperature which can contribute to incomplete fuel combustion and allows engine combustion products to condense in the exhaust and oil to leak past the rings.
Winterization kit	The optional winterization kit, located on the inside of the right-side panel, is a fuel-fired coolant heater providing the ability to heat the coolant in extreme cold conditions.

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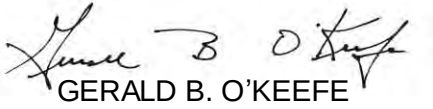
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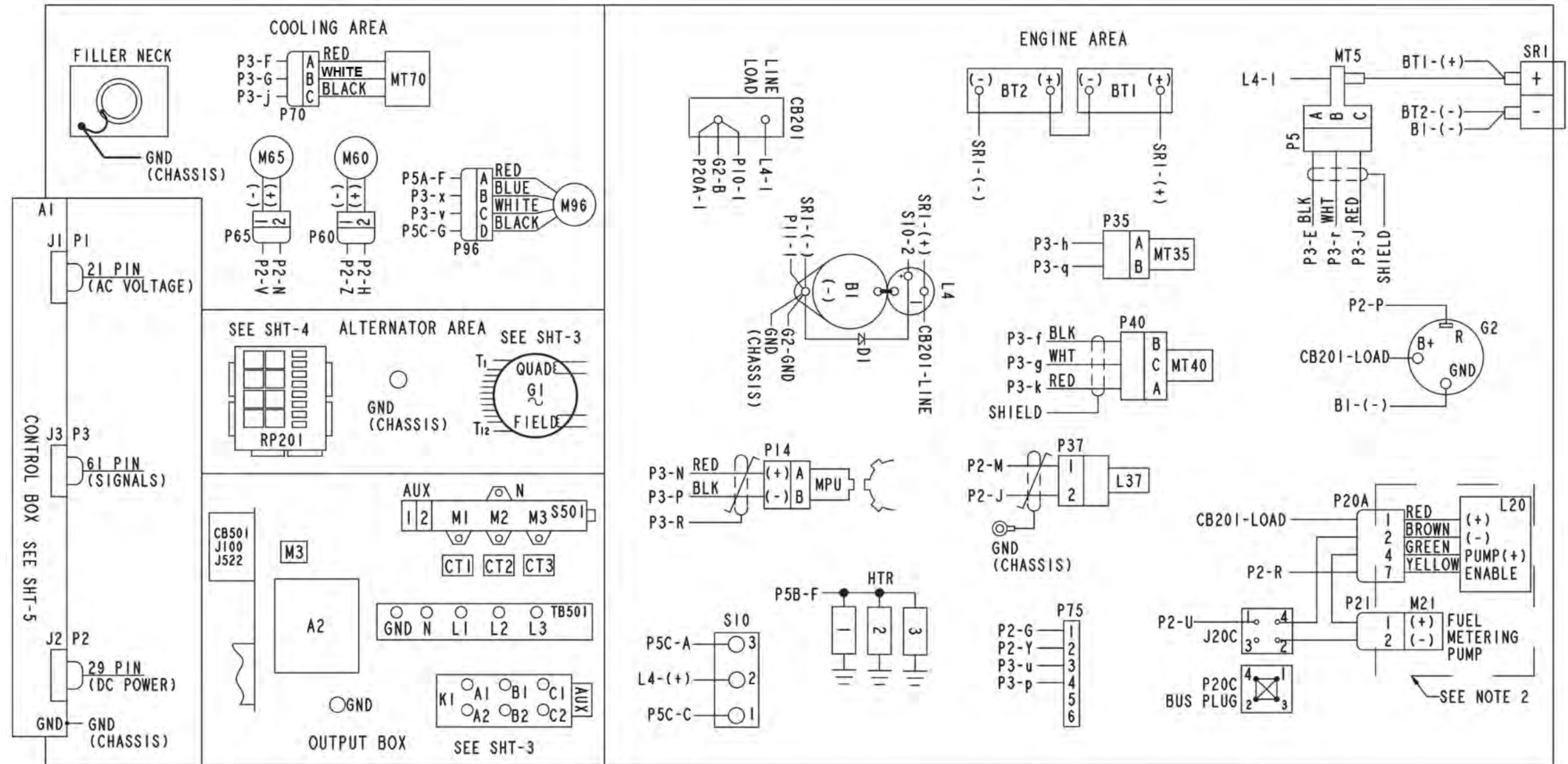
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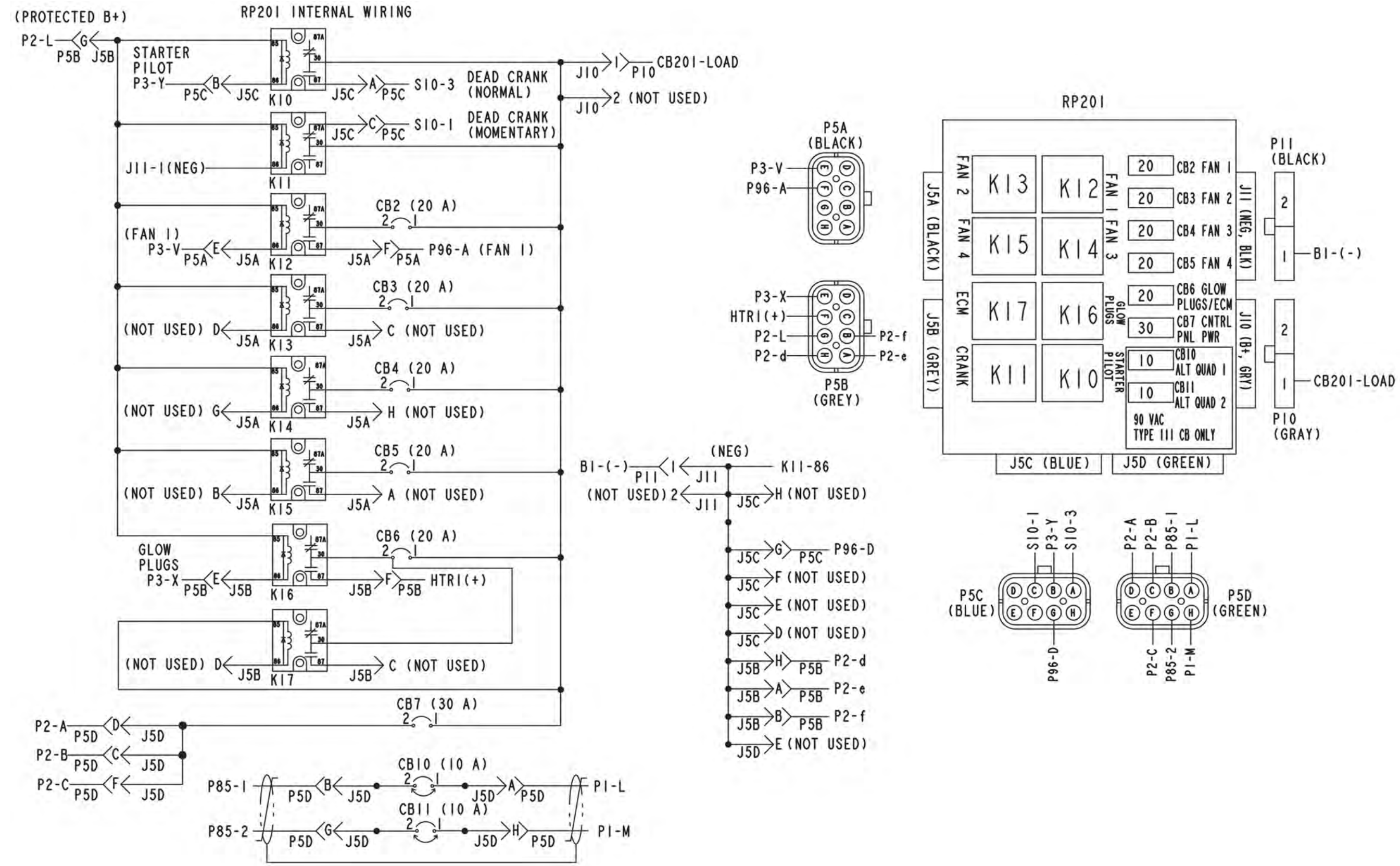
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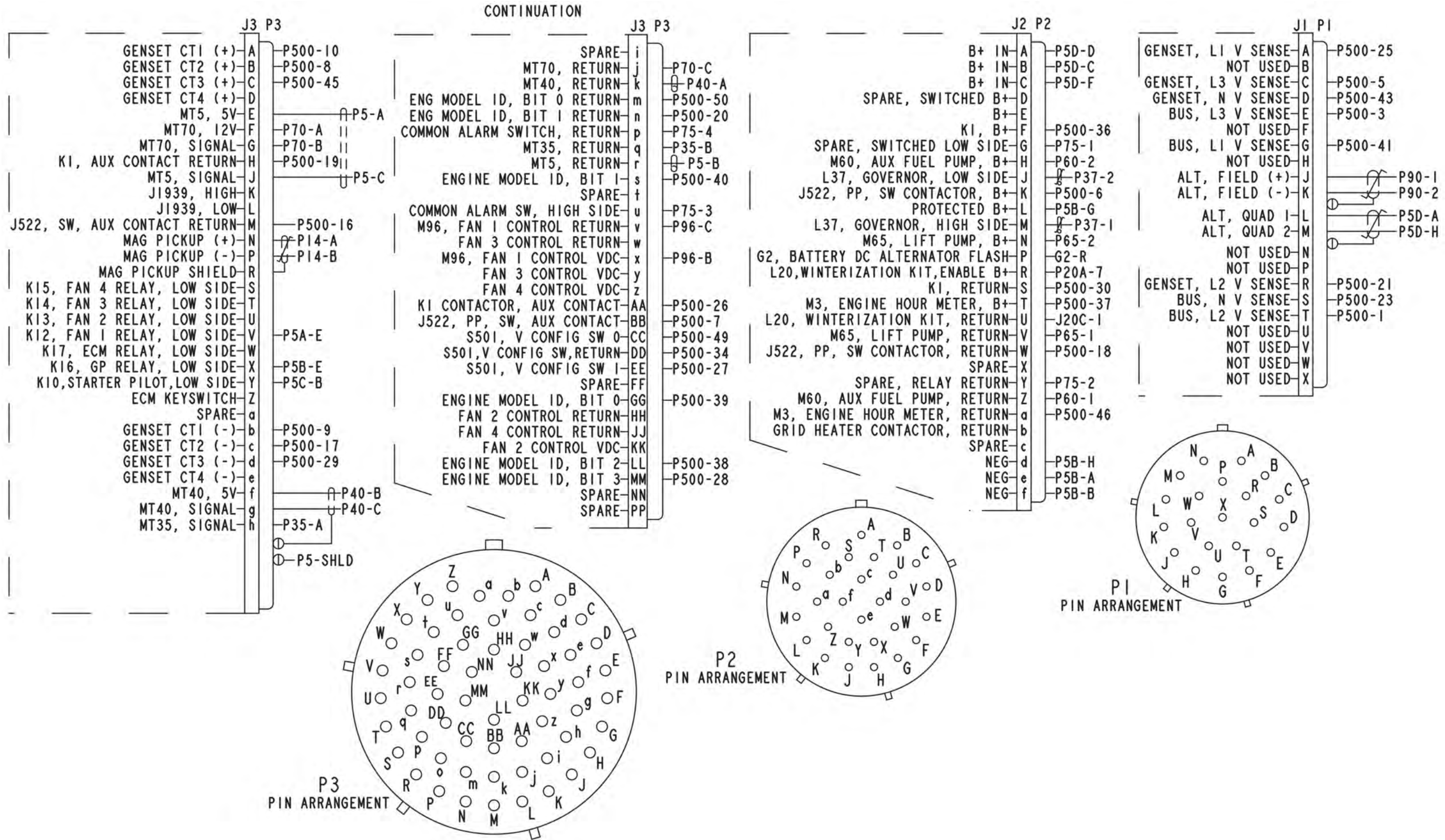


FO-1. Wiring Diagram (Sheet 1 of 4).

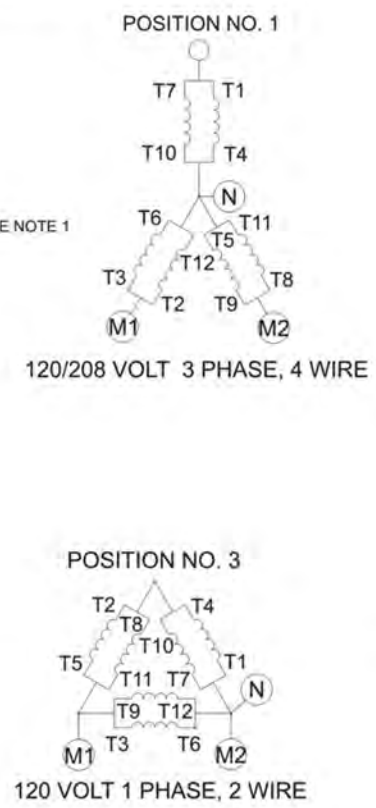


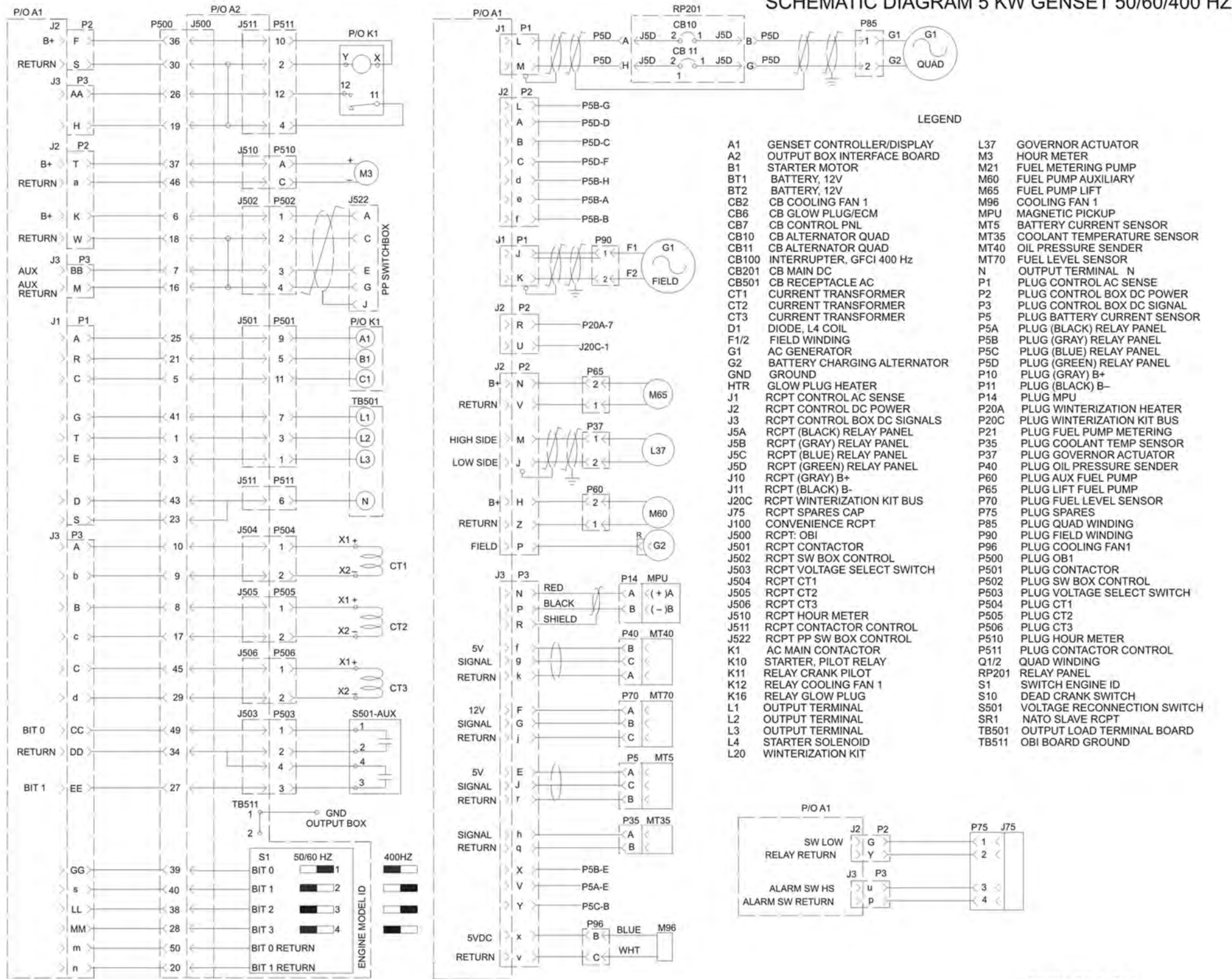


FO-1. Wiring Diagram (Sheet 3 of 4).



FO-1. Wiring Diagram (Sheet 4 of 4).





THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter = 10 Millimeter = 0.01 Meters = 0.3937 inches
 1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 inches
 1 Kilometer = 1000 Meters = 0.621 Miles

SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeter = 0.155 Sq. Inches
 1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
 1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
 1 Kilogram = 100 Grams = 2.2 lb.
 1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
 1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
 1 Liter = 1000 Milliliters = 33.81 Fluid Ounces

TEMPERATURE

$5/9 (^{\circ}\text{F} - 32) = ^{\circ}\text{C}$
 212° Fahrenheit is equivalent to 100° Celsius
 90° Fahrenheit is equivalent to 32.2° Celsius
 32° Fahrenheit is equivalent to 0° Celsius
 $9/5 ^{\circ}\text{C} + 32 = ^{\circ}\text{F}$

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.350
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilo pascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.763
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.714
Cubic Meters	Cubic Yards	1.307
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.204
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilo pascals	Pounds per Square Inch	0.145
Kilometers per Liter	Miles per Gallon	2.352
Kilometers per Hour	Miles per Hour	0.621

